THE IRON TRADE REVIEW

A JOURNAL OF THE IRON, STEEL, MANUFACTURING AND TRANSPORTATION INTERESTS OF THE CENTRAL WEST.

VOLUME XXI. CLEVELAND, O., JULY 19, 1888. NUMBER 30.

DRILLING MACHINES,

All Styles.

UPRIGHT DRILLS,

20 to 38 Inch Swing.

Latest designs and improvements. All fitted with our patent quick return of the spindle.

For cuts and prices address

BICKFORD DRILL CO.,

170 to 180 E. Front St., Cincinnati, O.

"OUT IN RAIN" FOUNTAIN.

VASES, SETTEES, CHAIRS, FOUNTAINS and LAWN FURNITURE

Of every description. Send for Illustrated Catalogue.

Builder's WIRE AND IRON WORK,

Manufactured by

E. T. BARNUM, - DETROIT, MICH.

New Works—Grand River Ave.

E. C. ATKINS & CO.

INDIANAPOLIS, IND. and MEMPHIS, TENN.

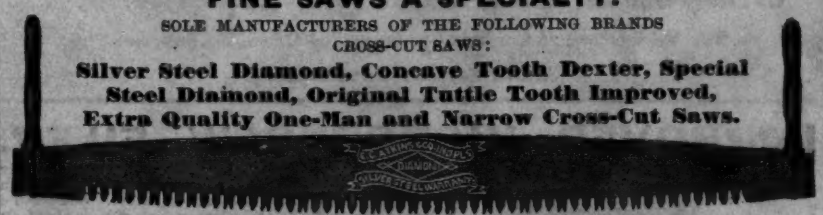
—MANUFACTURERS OF—

CROSS-CUT, CIRCULAR, BAND AND GANG SAWS.

FINE SAWS A SPECIALTY.

SOLE MANUFACTURERS OF THE FOLLOWING BRANDS CROSS-CUT SAWS:

Silver Steel Diamond, Concave Tooth Dexter, Special Steel Diamond, Original Tuttle Tooth Improved, Extra Quality One-Man and Narrow Cross-Cut Saws.



ALL LUMBERMEN REQUIRE CROSS-CUT SAWS.

USE ONLY THE BEST.

Our CROSS-CUTS are acknowledged as "Incomparably the best in use," and are. We are Agents for **Tanite Emery Wheels and Grinding Machinery.**

REYNOLDS BROS.,

MANUFACTURERS OF ALL —KINDS OF— **HAND-CUT**

Files & Rasps

Extra Tempered.

Old Files Re-cut, and warranted superior to any machine-cut or lead-tempered made. Orders by Mail Receive Prompt Attention.

142 & 143 N. Water-st COLUMBUS, O. [621y

TOLEDO WIRE WORKS.

F. POWELL & CO.

Manufacturers of

COAL SCREENS,

WIRE BANK RAILINGS,

PLANT STANDS.

FIRE PROOF LATHING, &c.

Summit Street. TOLEDO, O

PATENTS.

M. D. & L. L. LEGGETT,

Attorneys at Patent Law

Patents obtained in the United States and al Foreign countries. 52

Masonic Building. CLEVELAND, O.

E. H. JONES & CO.,

223 and 225 River St., CLEVELAND, O.

Engineers and Contractors.

Worthington Steam Pumps,

Electric Light Engines

AND

Automatic & Slide Valve Engines

Of all Descriptions.

STEAM PLANTS, COMPLETE, FURNISHED AND SET UP.

PRESSED WROUGHT IRON OPEN TURNBUCKLES.

THE BEST and CHEAPEST.

—MADE BY—

CLEVELAND CITY FORGE & IRON CO., Cleveland, O.

The Kilby Manufacturing Co.,

CLEVELAND, OHIO,

—SUCCESSORS TO—

The Prospect Machine & Engine Co., of Cleveland, O., and Barney & Kilby, of Sandusky, O.

Recent extensive additions to our Shops and Machinery makes our Plant one of the largest and best equipped in the country.

We are now prepared and have facilities for doing Foundry and Machinist work of every description. Shall be glad to furnish estimates on application for Engines, Boilers and other heavy Machinery. 72-1y

STILWELL'S

Patent Lime-Extracting

Heater and Filter

Combined.

Is the only lime extracting Heater that will prevent scale in steam boilers, removing all impurities from the water before it enters the boiler. Thoroughly tested.

Over 3,000 of them in Daily Use.

This cut is a fac-simile of the appearance of a No. 5 Heater at work on ordinary lime-water when the door was removed, after the Heater had been running two weeks.

Illustrated Catalogues.

Stilwell & Bierce Mfg. Co.,

DAYTON, OHIO.

UNIVERSAL RADIAL

RADIAL DRILLING MACHINES

THREE DESIGNS. SIX SIZES.

EMBODY ALL DESIRABLE FEATURES.

PRICES $450.00 & UPWARD

ADDRESS UNIVERSAL RADIAL DRILL CO. CINCINNATI, O. U.S.A.

Walker's Tool Holder.

For holding drills and reamers for lathe work. Prevents breaking or slipping. Can also be used for drilling and reaming holes by hand, and for reaming holes under drill presses, etc. Five holders in a set. Made with ouble handle, when required.

Walker Mfg Co CLEVELAND, O.

RAWHIDE VALVES

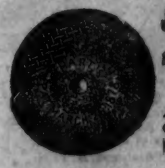
FOR BLAST FURNACE BLOWING ENGINES.

Guaranteed superior to valves made of oak-tanned leather, being soft, pliable and very strong. Sample orders solicited, not to be paid for unless satisfactory.

Parkin & Bosworth.

9 & 11 SOUTH WATER ST., CLEVELAND, O.

Emery Wheel Machinery.



J. WENDELL COLE, M.E.

Manager of Pennsylvania Southern Lake regions, and the Northwest for

DETROIT EMERY WHEEL CO.

Address: Box 84, Columbus, O. or P. O. Box 152, Chicago.

Hart's Corundum-Emery Wheels

QUINT'S AUTOMATIC

Steam Engine Governor

for single slide or rotary valve engines. Patented Feb. 22d, 1887. Same can be applied to the ordinary slide valve throttle governor engine converting the engine into an Automatic Cut Off. It has had a practical test on engines running 750 revolutions per minute, and gives the best of results. It is simple and strong in its construction and accurate in its regulation. Address LEONARD & McCOY, 118 Liberty St., N. Y

93eow26t

Machinery Manufacturers' Association

—FOR SUPPLYIN —

MACHINE SHOPS, FOUNDRIES, PLANING MILLS, PAPER MILLS, ROLLING MILLS, FLOURING MILLS, MINES, CAR-SHOPS, RAILWAYS, ETC.,

With MACHINERY, TOOLS, and other EQUIPMENTS, at the Makers' Lowest Prices.

I. H. PRATT, Manager.

OFFICE:

80½ St. Clair St. Opp. Kennard House, - **CLEVELAND, Ohio.**

WRITE FOR PRICES.

C. A. Tyler
WIRE WORKS CO.

MANUFACTURERS OF

WIRE CLOTH

Of Every Description,

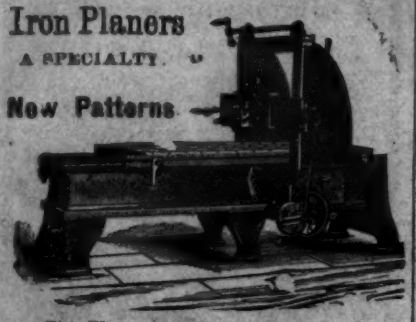
Office Railings,
Elevator Enclosures,
AND ALL KINDS OF
Architectural Wire and Iron Work.

W. S. TYLER, President. E. H. ALLEN, Sec. & Treas.
CLEVELAND, OHIO.

Iron Planers

A SPECIALTY.

New Patterns

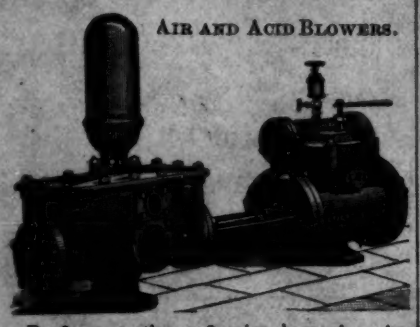


Sizes from 20 in. by 20 in. and 30 in. by 30 in. to plane from 4 to 10 feet in length.

Rochester Machine Tool W'ks
LIMITED,
84 Rochester, N. Y.

Locke Patent Steam Pumps.

AIR AND ACID BLOWERS.



For fire protection, refineries, breweries, pipe lines, etc. Pumps and Blowers fully Guaranteed

YOUNG & LOCKE, Titusville, Pa.
Box 991. 43

The Fairy Tricycle.
Easy, CHEAP, Healthful, Graceful. Best for girls, adults and invalids. Only practical machine for cripples to run by hand power. For circulars, address FAY MFG. CO., Elyria, O.

AMERICAN

FOUNDRY PRACTICE.

TREATING OF

Loam, Dry Sand and Green Sand Moulding,

AND CONTAINING

A Practical Treatise upon the Management of Cupolas and the Melting of Iron.

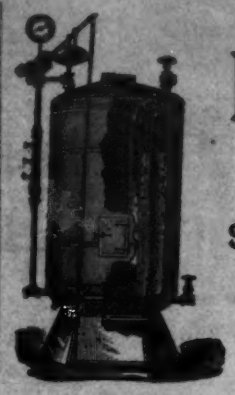
BY THOS. D. WEST,

Practical Iron Moulder and Foundry Foreman. Fully Illustrated.

Sent by Mail, Postage Paid, on Receipt of Price, $2.50.

Cleveland Printing and Pub. Co

Cleveland, Ohio



—THE—

Mount Joy Steam Heater

MANUFACTURED BY THE
MOUNT JOY STEAM HEATER CO.,
MOUNT JOY, PA.

Self Feeding Magazine.
Self Draft Regulating.
Reputation Established.

Send for Catalogue 04-1y

FREIGHT AND PASSENGER

ELEVATORS

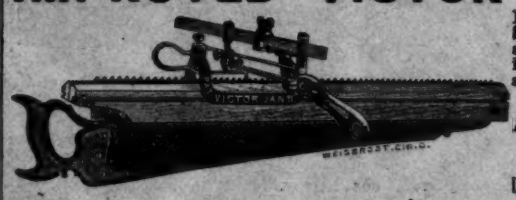
L. S. GRAVES & SON,

Corner Center and Frank Streets, Rochester, N. Y.

New York Office, 46 Cortland St.; Cleveland Office, 208 Superior St.

Send For Our Catalogue.

IMPROVED VICTOR SAW FILER.



Latest and best machine for Filing Saws of every description. Absolute in action. Elegant in finish. Reasonable in Price. Descriptive circular sent on application.

Price complete $2.50.

Address,
Robt. J. Schaeffer & Co.,
[221y] DAYTON, O.

JAMES P. WITHEROW,

Engineer and Contractor,

Lewis Block. Pittsburgh, Pa..
General Agent for

Whitwell Fire-Brick Stoves and Clapp-Griffiths Patents

For the Manufacture of Soft Steel.

Specially adaped for A No. 1 Boiler Plates, Boiler Rivets, Wire Rods, Stay Bolts, Stamping ware Nail Plates, etc. Will contract to completely erect, equip and place in operation blast furnaces, Whitwell stoves, and steel plant s as above. As I manufacture at my own works everything appertaining to blast furnace and steel works construction I can guarantee promptness and satisfaction ! 81

Fabric Fire Hose Co.,

MANUFACTURERS OF

Cotton Fire Hose.

FOR

MILLS AND FACTORIES.
HOSE JUMPERS. RACKS & REELS.

5 Barclay Street,
NEW YORK.

PHOENIX IRON WORKS
W. H. THOMPSON
PROPRIETOR
MANUFACTURER OF HAND POWER CRANES
FOR FORCES, PIPE FOUNDERS, ROLLING MILLS, WIRE WORKS, FOUNDRIES, MACHINE SHOPS, DOCKS & MINES
LOCOMOTIVE, PIVOT CRANES, OVERHEAD TRAVELING CRANES
SEND FOR CATALOGUE
WASSON AND SUPERIOR STS.
CLEVELAND, O.

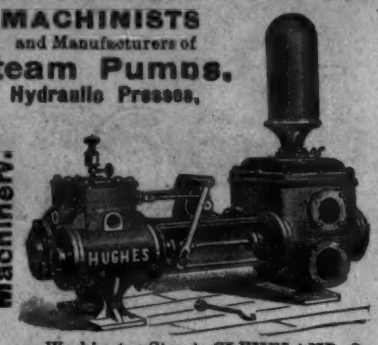
THE CANTON STEAM PUMP CO.
MANUFACTURERS OF
MILLER IMPROVED, DUPLEX, UNIQUE AND TORRENT STEAM PUMPS.

Over 10,000 Boiler Feed Pumps in use. Every pump guaranteed. Send for illustrated and descriptive Catalogue.

CANTON STEAM PUMP CO.,
21-1y CANTON OHIO.

HUGHES STEAM PUMP CO.

MACHINISTS
and Manufacturers of
Steam Pumps.
Hydraulic Presses,
And General Machinery.



Elm, cor. Washington Street. CLEVELAND, O.

PATENTS.

JOSEPH A. OSBORNE,
Patent Attorney,
29 EUCLID AVE., CLEVELAND, OHIO.

Patent Causes litigated in the United States Supreme and Circuit Courts. UNITED STATES AND FOREIGN PATENTS SECURED. Searches and Opinions as to the Scope, Validity and Infringement of patents. Terms Reasonable.

ECLIPSE ELECTROTYPE ENGRAVING CO.

ANDREWS & AUST PROPRIETORS
LITHOGRAPH BUILDING CLEVELAND, O.

J. M. Allen, Pres. Wm. B. Franklin, V. Pres
J. B. Pierce, Sec'y.

HARTFORD STEAM BOILER INSPECTION AND INSURANCE CO.

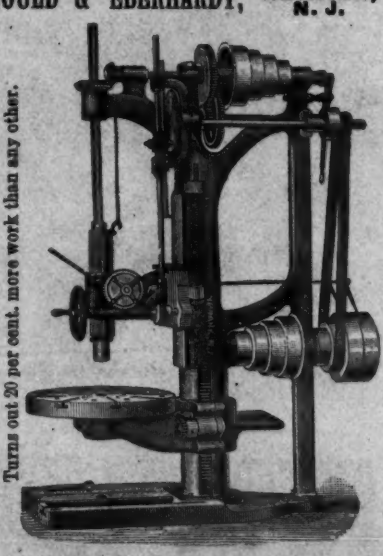
GEO. P. BURWELL, Gen. Agent.
246 Superior St.,
CLEVELAND, O.

A. C. GETCHELL,
9 Chief Inspector.

E. GOULD & EBERHARDT, NEWARK, N. J.

EBERHARDT'S NEW DRILL. APPLY TO

Turns out 20 per cent. more work than any other.



RUBBER STAMPS for the WORLD

C. J. CONOLLY & CO.
[Established 1873.]

RUBBER STAMPS
CORPORATION SEALS.

Tom Thumb Stamp. Price $1.
Send for Prices and Circular before ordering elsewhere.
THE BEST WORK.
Self-Inker. Price $3 and up.
Burning Brand. Special Prices.
Price $4 and up.
Steel Stamps. 15 cts. per letter.
STENCILS
Burning Brands, Self-Inking Stamps, Marking and Stencil Brushes, Rubber Stamps and Dates of all kinds.
Printing Wheel.
Pocket Stamps. Price 50 cents.

Rochester, N. Y.

THE IRON TRADE REVIEW

A JOURNAL OF THE IRON, STEEL, MANUFACTURING AND TRANSPORTATION INTERESTS OF THE CENTRAL WEST.

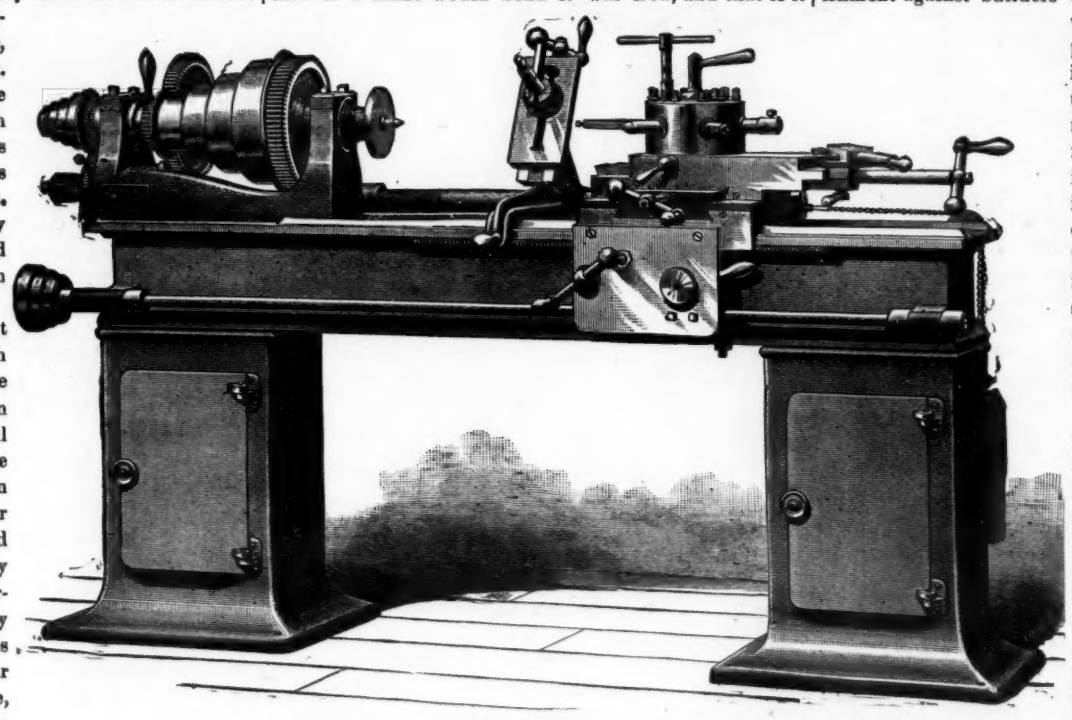
VOLUME XXI. CLEVELAND, O., JULY 19, 1888. NUMBER 30.

A NEW TURRET LATHE.

With this issue we present an illustration of a turret lathe, built for brass-workers' use and similar work, and which possesses some new features worthy of attention by those interested in such tools. A glance at the cut will show that it is provided with the usual chasing bar and other regular features of brass workers' lathes, and that the carriage has an automatic feed along the bed, by means of a belt-driven feed-rod and friction device, the same as an engine lathe. In addition to this feed there is a longitudinal slide immediately under the turret, which may be moved by the screw and crank-handle at the right or, rapidly, by the lever shown between this handle and the turret; it being necessary only to tighten or loosen the short locking lever shown beneath the slide, to change from one motion to the other. This slide is fixed in line with the shears, and is not changed for taper work. The next slide beneath it is a transverse one, worked by a cross feed screw and handle, in the usual manner, and is also fixed, being always at right angles for facing. Immediately beneath this is another transverse slide which constitutes the special new feature, and is used for taper work. It is moved across the carriage by a taper attachment which is between the shears, and is upon the same principle as the slate taper attachment. The bar can be set to any desired taper by a graduated index reading to 64ths of an inch to the foot.

When the taper attachment is not in use, a taper pin, which is inserted, holds the slide exactly central. It will be seen by this arrangement that all the advantages of the slate taper attachment, as used on on lathes, are secured. Taper work can be bored or turned either by power feed, or by hand movement of the carriage; at the same time, any part of the work which is straight may be bored or turned by the upper slide, without disturbing any of the adjustment, or re-chucking the work, and facing can be done square by means of the upper transverse slide, without disturbing the taper attachment. This obviates the necessity for making changes for facing work, parts of which are taper—a point which will be appreciated on a good many lines of work.

To explain further, when a taper hole is being bored and part of same requires to be bored straight, it may be done by simply feeding the top slide forward with lever or screw, instead of feeding with carriage; then as live head always remains in line with shears, and the cross feed at exact right angles with same, it will face square across after boring taper without change. As will be seen, the legs are made into closed cabinets, useful for holding tools and fixtures, and the machine is back-geared, and strongly driven. The builders are Lodge, Davis & Co., Cincinnati, Ohio, who will be pleased to give any further information desired.



A NEW TURRET LATHE.

Prices of Nails in 1838 and 1888.

Wheeling Intelligencer.

There is a striking discrepancy in the price of nails now and fifty years ago, and as striking a discrepancy in wages then and in 1888, albeit the other way. In an old scrap of newspaper, bearing date April 17, 1838, which was recently found by Mr. W. F. Stefel, among some old papers in his attic, is a price list of nails and iron in an advertisement of the Top mill. Then everything was quoted by the pound, and as 100 pounds of nails make a keg, the price per pound in cents is equal to the price per keg in dollars. As nails are now sold at from $1.90 to $2.50 per keg, equal to 1.9 to 2½ cents per pound, the great difference is seen at a glance:

NAILS AND SPIKES.	Per lb.
10d, 12d, 16d, 20d	5¾
8d, 9d	6
6d	6¼
5d	6¾
4d	7¼
3d	8 1-5
Spikes and boat nails	6½

Hoop iron ranged from 7 to 9 cents per pound; sheet iron from 7¾ for 13, 14 and 15 gauge to 8¾ cents for 22 23 and 24 gauge.

Iron or Steel.

The most experienced engineers begin to find it hard to understand the distinction between iron and steel. Some thirty years ago it was common to hear it remarked that if a knife would bend it was iron, and that if it broke instead of bending it was steel. Now there is very little difference between mild steel and wrought iron, and the former bends nicer than the latter. This, we understand, was very clearly demonstrated in some recent experiments in coiling the spirals of different designs of the New Patent Anti-Friction Conveyor. Not only did the steel coil true, but it stood the severest tests, and bent easily around a two-inch diameter mandril, while wrought iron coiled eccentrically and showed signs of fracture. The mild steel was supplied by the Weardale Iron Company. It would be well if some capable person undertook the compiling of a work setting forth clearly the distinctions by which iron may be distinguished from steel.—[London Iron & Steel Trades Journal.

T. DAW, a Japanese civil engineer, has been up at the Connellsville (Pa.) coke ovens getting points about the manufacture for copying in Japan, where ovens will be established. He has also inspected the coal mines and the manufacture of iron.

THE Standard Oil Company seem to be in earnest on the question of building extensive works in South Chicago. The contract for lumber has been let to A. R. Beck & Co., of that place.

THE DEADLY ELEVATOR.

American Machinist.

We have frequently spoken of the loss of life resulting from the misconstruction and misuse of elevators, setting forth the belief that they were more destructive than poorly constructed and ignorantly attended steam boilers. But the boiler makes more noise in its work of destruction, and it destroys more property in its failure than the elevator. The following from the New York *Tribune*, is interesting in indicating to what extent the elevator gets in its work:

Few people hear of the shocking accidents which are caused by the falling of elevators in the hotels, places of business, factories and public buildings. In one hospital alone in this city, within the short period of one month, there are recorded nine or ten serious accidents from this cause. The falling of the elevators has resulted in many cases in death; in other cases in fractured skulls and spines and fractured feet and concussion of the brain. Law should direct a most severe punishment against builders of elevators for the defects which make these accidents possible. The innocent public is lulled into the belief that the elevator is safe, because a notice in it states that it is regularly inspected. No punishment is too severe to be inflicted upon contractors who construct these death traps for the public. With greater vigilance on the part of steamship and railroad officials and elevator builders, the present risks to human life can be very much lessened.

The statement of fact in the above is to the point. Regarding the work of inspection, it is as plain as need be that it defective. There can be such an inspection of elevators as will render accidents from their falling rare indeed. And such inspection should be provided for and insisted upon. Until this is done the elevator will keep along doing a steadily increasing business in filling the hospitals. With the growth of our large cities, elevators are coming more into use, and the danger from their use is being multiplied, not only by the increase in numbers, but from the fact that more and more are liable to fail from the infirmities of age.

Oil in a Wire Mill.

The fuel gas-producing invention of a Pittsburgh mechanic, now controlled by W. H. Denniston and others, of that city, is being tried at the works of the Oliver & Roberts Wire Company, Limited, at Pittsburgh. The apparatus consists of a furnace in which there are two cast-iron retorts. Into these, steam is introduced and superheated, joined with hot air forced in at a pressure. To these, with the retorts at the proper degree of heat, is added crude oil, the whole forming a gas which burns with clear white, and almost smokeless. It is said that the gas will make an excellent illuminant. One of the new plants will soon be put in the rolling mill of the Judson Mfg. Company, at San Francisco, Cal.—[Iron Age.

THE biggest tree in Ohio has been cut down. It was near Taylorsville. Its trunk's diameter was 11 feet 8 inches, and its height was 240 feet.

A FOUNDRY CUPOLA EXPERIENCE.

BY FRED'K. A. SCHEFFLER, ERIE, PA.*

Recently one of the large manufacturing firms in the western part of Pennsylvania, outgrew the capacity "output" of their foundry cupola.

The capacity of the old cupola was forced to 34,000 pounds per day, and it required the blower to be in operation from 3 P. M. until the final charge was withdrawn, which occurred about 5.30 P. M. The cupola was then so hot that in the morning it was quite unfit for the cupola-tender to make ready for the daily "heat."

The size of the cupola was 60 inches outside diameter, and 44 inches inside, the fire-brick lining being 8 inches. The distance from the bottom, or outlet spout to the charging door was between 13 and 14 feet. There were two rows or sets of tuyeres, one above the other, being virtually a well-known Detroit cupola. The greatest amount of blast obtainable was 9 ounces, and the blast gate was wide open continually throughout the heat, notwithstanding the fact that the blower (Sturtevant's make No. 8) was speeded 100 revolutions faster than the list called for to produce a 12-ounce blast. The fan was situated 90 feet from the cupola, and was connected by an 18-inch galvanized iron blast pipe, which was straight with the exception of the elbow where it left the fan, and the Y-shaped connection into the cupola, the two arms of the Y forming at the same time vertical elbows each 10 inches in diameter.

The capacity of the new cupola was desired to be 10 or 12 tons per hour, which would increase the output about 20 per cent. in the same length of time and shorten the time required for a "heat" of the ordinary size. The dimensions and style agreed upon called for a 72″ shell, which when lined up with 8″ of fire-brick would make 56″ inside diameter. The height was 15 feet from spout to charging door, and this space would contain 10 tons, not including fuel. The tuyeres were eight in number and all located on the same horizontal plane, being in shape the form of an equilateral triangle, each side being six inches long. They were placed at a height of 24 inches from the base plate, and were surrounded by a blast box 12 inches square. The new cupola was to be erected in close proximity to the old one, and it was desired to utilize the same connecting blast pipe for both cupolas. The question of size of blower required to give the proper blast for the new cupola was a serious one, for it was fully believed that the one already in use could not possibly supply the amount required.

Bids were asked for a fan which would be guaranteed to melt 12 tons of iron per hour in a cupola 56 inches inside diameter. The bids were all about the same in regard to size of fan required to produce the work and necessary (12 ounces) blast. One well-known firm advised a fan so close in size to one already in use, that the surprise was very great, as both fans were similar in construction. Hence the suggestion arose that there must be something radically wrong with either the fan, or both the blast box around the old cupola and the tuyeres in the same, and it was determined to discover, if possible, where this defect lay, by simply connecting the 18-inch blast pipe into the new cupola.

The branches of the Y connections were 12″ diameter. The general arrangement of cupolas and connections is shown in the engraving (Fig. 1). It will be noticed that either cupola can be run independently of the other, and all connections are so arranged that it was not necessary to shut down a day to make the new connection.

The first heat taken from the new cupola was very successful. The succeeding ones were still better, and not only were they "run off" quicker and better than any of those taken from the old one, but the blast was so great that the water in the gauge, which was only intended to register up to 10 ounces of blast, was blown out of the top of the same, and when the new one was made, the pressure was found to be between 11 and 12 ounces. No change of speed of blower had been made, and the same main blast pipe was utilized. The "heats" were taken off with the blast gate only one one-quarter open, whereas with the old cupola this gate was required to be wide open almost continually throughout the heat.

As will be noticed, the trouble was with the blast box on the old cupola, and the tuyeres in the same, and not with the fan. The tuyeres were five in number in each row (there being two, an upper and lower row), and were too small in size to admit the amount of blast which the fan was capable of developing, consequently the latter was "choked." It is simply impossible to get the full benefit from a fan unless it has practically no outward friction to the passage of the greatest blast which it is capable of producing, or at least unless this friction has been largely reduced. The facts which are presented by the above experience are as follows:

That by using a small amount of practical common sense, a fan which had been pretty well "rattled" was to bring out that which it had long been striving to do by making the final exit passages (tuyeres) of a combined area greater than the area of the pipe at the outlet of the fan, and by reducing the blast box to a size which would be no larger than actually required, this being in cross section about 10 per cent. more than the area of the fan outlet. When forcing air into the new cupola under the above circumstances, the fan does not require as much power to drive it, and in the same time more iron can be melted with it than it was possible to melt in the old cupola. The latter melted at the rate of eight tons per hour, the new one at the rate of ten tons.

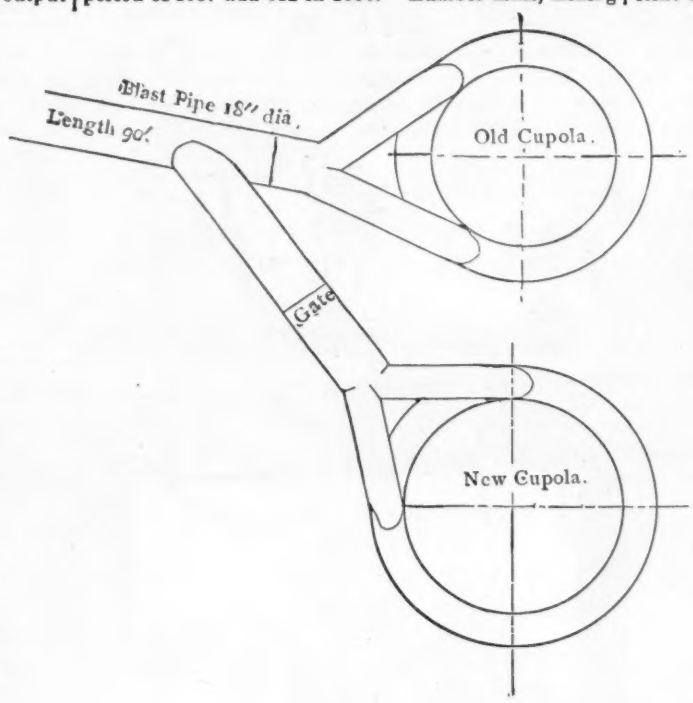


FIG. 1.

*Read at the Seventeenth Semi-Annual Convention of the American Society of Mechanical Engineers, at Nashville, May 9th, 1888.

Southern Industrial Progress.

The Baltimore *Manufacturers' Record* estimates the total number of new enterprises reported during the first half of 1888 at 2,023, against 1,855 in the same period of 1887 and 812 in 1886. Lumber mills, mining enterprises, canning factories, machine shops and brick works note the largest number of new enterprises, in the order named, and account for over one-half of the total number started. The amount of capital and capital stock represented by the list of new enterprises and the enlargement of old plants for the first six months of 1888 were: Alabama, $14,940,000; Arkansas, $4,976,000; Florida, $2,030,000; Georgia, $5,792,000; Kentucky, $12,144,000; Louisiana, $1,776,000; Maryland, $3,129,000; Mississippi, $837,000; North Carolina, $3,999,000; South Carolina $3,153,000; Tennessee, $6,025,000; Texas, $11,749,000; Virginia, $5,965,000; West Virginia, $3,993,000. Total $81,508,000. Referring to the many new furnaces now going into blast in the South, the *Record* says: "The production of pig iron alone in Alabama next year will greatly exceed in value the entire value of all manufactures in that State in 1880. In 1880 the value of the manufactured products of Alabama was $13,000,000, and the value of the agricultural products $56,000,000, or considerably more than four times as great. In 1889 the value of the products of the manufacturing and mining interests of that State will exceed the average yearly value of all agricultural products. Moreover, the manufacturing and mining products will next year furnish fifty times as much freight to the railroads as the entire cotton crop of the State. What Alabama is doing in developing her industrial resources is being vigorously followed by every Southern State."

THE production of lead in the United States in 1887 was 160,700 tons.

THE VAPOR STOVE TRADE.

Through the courtesy of Hon. D. A. Dangler, president of Dangler Vapor Stove & Manufacturing Co., of Cleveland, we are enabled to present to our readers some very interesting facts concerning the vapor stove trade, its growth and history.

Vapor stove interests date back to the year 1879. The first patent was issued in 1863 for burners for heating purposes, and five years later this burner was placed upon the market with indifferent success.

In 1873 the business took a new start, when an apprentice invented what was known as the noiseless vapor burner. A few stoves were manufactured annually from 1873 until 1879—that is, not to exceed more than 1,000 stoves were made and put into use.

In 1879 the business fell into the hands of practical business men and was pushed with vigor from that day, with what success may be judged by the following figures showing sales from 1879 to 1888:

THERE WERE MADE AND SOLD IN	Stoves.
1879	1,500
1880	7,000
1881	15,000
1882	20,000
1883	35,000
1884	50,000
1885	65,000
1886	80,000
1887	105,000
1888 (estimates)	140,000

During these years continued improvements were made in burners and the style of stoves, until to-day gasoline stoves are manufactured that will do the work of large improved coal and wood ranges. They also make handsome articles of kitchen furniture. Some of these may be seen at the Centennial Exposition in Cincinnati that are real works of art. They run in all sizes, costing from $3 to $25 at retail prices. Cleveland, Ohio, being pioneer manufacturers, the vapor stove trade has extended from that point to the Western, North and Southwestern States. They are now finding their way into the South, which locality is most naturally adapted to their use on account of their peculiar merits and labor-saving qualities, absence of surplus heat, etc. California has become a large market also, owing to the scarcity of other fuel material.

Even the New England States have become educated to the fact that the West is capable of producing an article, the merits of which they are forced to acknowledge, and these stoves are now being largely introduced and sold in all the Northeastern States.

The greatest obstacle in the introduction and use of vapor stoves has been the prejudice of the insurance companies, who violently opposed the use of gasoline, but owing to the marked and continued improvement in the construction of stoves, making them absolutely non-explosive, a report of boards of underwriters in localities where these stoves are almost in general use during the past three years, has clearly demonstrated by statistics that the risk is fully 25 per cent. less than from the use of ordinary coal and wood cook stoves and ranges on account of defective flues and other causes.

Further proof has also been offered that a much larger proportion of fires occur from the use of tobacco—smoking in bed—than from the use of gasoline. The majority of fire insurance companies will now permit its use without extra charge, providing certain conditions are complied with. This fact and the many other advantages of these stoves have made them a staple article, now handled by stove manufacturers and the trade everywhere.

A STRIKING instance of the effect which legislation may have on commerce has been brought to light. The Merchandise Marks Act has completely destroyed certain branches of German industry. Soon after its provisions became known and there operation was felt, cables were received from America by English agents for some American houses to cancel all orders for certain classes of German goods which had formerly been foisted on the public of the United States as of English manufacture. Plauen has suffered immensely, as the manufacture of cheap goods for the American market was formerly carried on there with great activity. The goods were shipped to England with labels which stamped them as of English manufacture. Now that they are labeled "German made," the American public utterly refuse to buy them at any price.

DANGER FROM ELECTRIC LIGHTING WIRES.

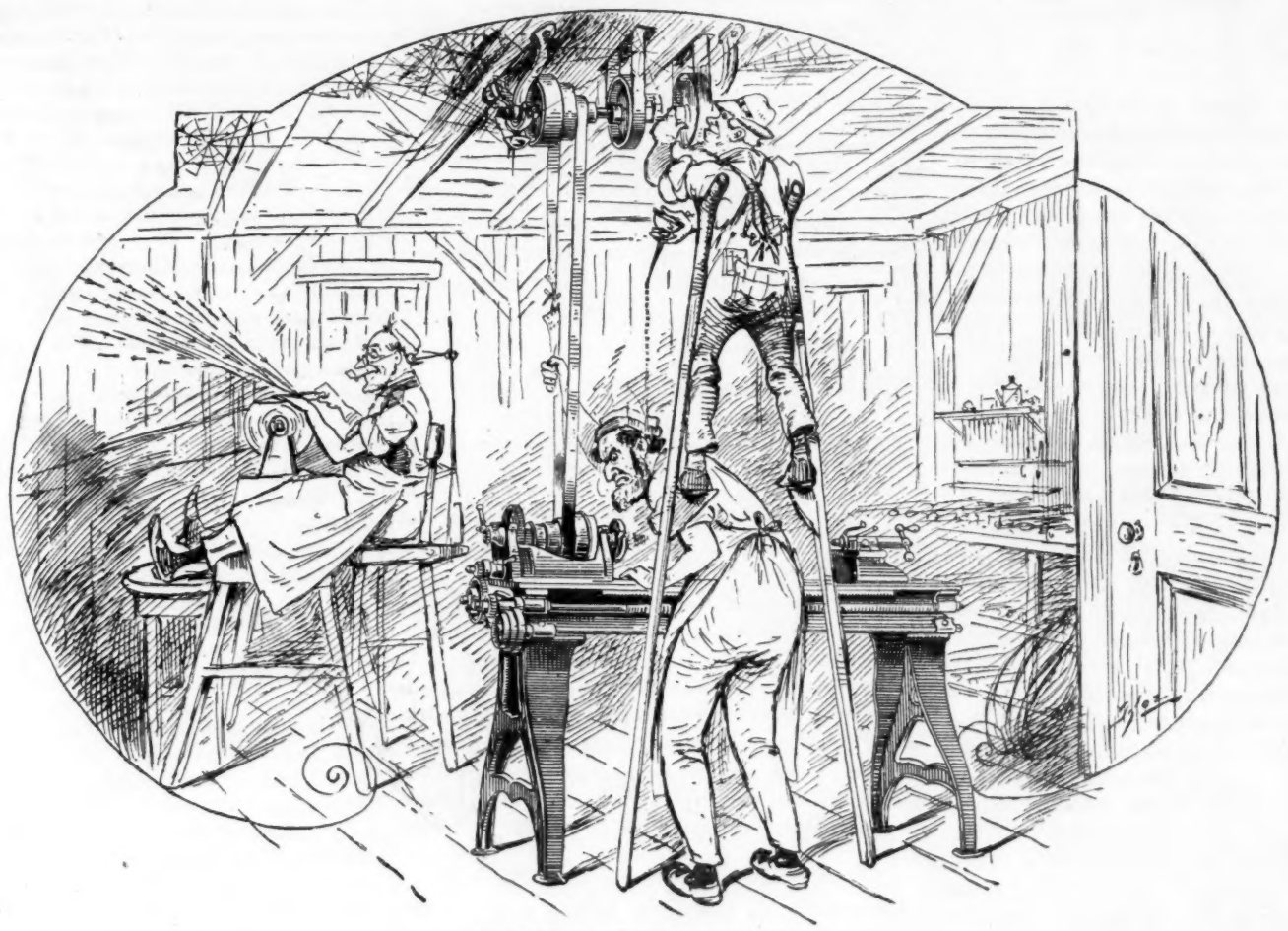
M. Mascart recently illustrated by experiments before the French Philosophical Society the possible dangers of fire from electric lights. He pointed out the necessity for precaution in electric light installations against excessive heating of the conductors, and the risk of materials being ignited by heat generated in the lamps. In the case of insulated wires laid under mouldings the heat generated was usually dissipated by conduction, which keeps down the temperature of the wire and its covering. An excessive current might destroy the insulation and inflame the wood. An experiment was made with a wire 1·2 mm. diameter, laid between two blocks of wood. This wire would in ordinary practice carry a current of 4 amperes, but in this experiment the current was increased to 40 amperes, at which point carbonization of the wood began. With a greater current the wood was ignited. To test the danger from lamps, the following eight experiments were made: 1. The globe of an arc lamp was covered with several thicknesses of a light fabric, such as green tarlatan. 2. A glow lamp of 32 candle power was covered in a similar manner, the folds of the cloth being held against the lamp by an India rubber band. 3. An incandescent lamp was covered with a cotton hood. 4. A glow lamp was covered with a similar hood of black silk, which was surrounded by another of velvet. 5. A lamp was covered with a layer of white wadding, the gummed surface of which had been removed. 6. Two glow lamps were covered with layers of wadding, one layer white, the other black. 7. A lamp of 32 candle power was placed in a vertical fold of an old theatrical scene. 8. A lamp of 300 candle power was laid in a similar scene. In cases 1, 2, 5, and 7 no carbonization nor excessive heating was caused for 20 minutes. In case 8 the scene commenced to carbonize without flame after 1½ minutes. At the end of 2 minutes the envelope of the lamps in 5 burst into flame, and in 6 minutes the velvet calotte in experiment 4 commenced to burn slowly. The cotton hood in 3 was partially carbonized at the end of 10 minutes, but was not set on fire.

The World's Production of Cast Iron.

The French *Bulletin du Ministere des Travaux Publics* for the month of March last, quoting from the *Revue Universelle des Mines*, gives the following particulars of the world's production of cast iron: In 1800, the production of cast iron of the whole world was 838,000 tons; in 1885, it was 19,406,000 tons. During the period comprised between 1865 and 1886, the increase of production, calculated for the year of greatest production was: In the United States, 456 per cent.; in Germany, 237 per cent.; in Austria, 152 per cent.; in England, 76 per cent.; in France, 64 per cent.; in Belgium, 63 per cent.; and in Sweden, 53 per cent. Great Britain produces more than the United States, which, in return, consumes more cast iron and steel. The consumption of the United States is at the present day one-fourth of the cast iron and one-third of the steel produced by the entire world. The diminution of cost of production effected in modern times by the improvements carried out in processes of manufacture is wonderful. Thus, a gross of steel pens, which are to-day sold at Birmingham for 4d., formerly cost £7 to produce. This industry is so important that a single manufactory at Sheffield now weekly sends to Birmingham twenty tons of rolled steel to be converted into pens.

IMPROVED OILING APPLIANCE.

The oiling appliance illustrated in the accompanying cut,* possesses several points of superiority over the ordinary ladder, which we are sure the readers of the IRON TRADE REVIEW will appreciate: 1. It dispenses with the necessity of carrying a ladder from room to room. 2. It enables the oiler to attend to his work without interruption to the workmen (as will be clearly seen by reference to the cut). 3. Should, for any reason, the oil cup be inverted, the intervention of the workman's head and neck will keep the oil from splashing the machinery and floor. Many other advantages will appear upon a closer inspection of the appliance, but want of space will not allow specific reference.



IMPROVED OILING APPLIANCE.

Trusts Before the Courts.

The Attorney General of New York, in a recent well-considered opinion, decides that the Sugar Trusts is such a criminal conspiracy to defraud the public, as to bring it within and under the terms of the criminal laws of the State of New York bearing upon that subject. The Supreme Court of Pennsyvania decides that such agreements are, in effect and reality, criminal conspiracies under the laws of that State. The importance of these decisions lies in the fact that under them any citizen of these States can prefer the charge of criminality against any member of these trusts, and it would seem that hereafter, the question of "trust or no trust" will depend entirely upon the courts and juries of those States. Under these conditions and surroundings the days of the trusts are numbered.—[Stoves & Hardware.

*From the catalogue of Sterling Elliott, Newton, Mass., manufacturer of cutting-off machines, tap-drill gauges, stitching and tying machines, etc.

CHEAP ALUMINUM.

A Newport, Ky., dispatch says: Experiments here have resulted in an extraordinary discovery, if the statements made by those interested are correct. The discovery is that of aluminum, which now costs $20,000 a ton, and is produced only in France, can be obtained anywhere by a most simple process, and at less than one-hundredth part of the present expense.

The importance of this discovery can be judged when it is recollected that aluminum is the most generally diffussed metal on earth, and has all the beauty of silver, besides being non-tarnishning, non-corrosive, more lasting than silver, with only one-fourth its weight. In addition, aluminum alloyed one-tenth of 1 per cent. with iron or steel increases the homogeneous and tensile strength of the metal nearly half, while for electro-plating purposes aluminum is superior to either gold or silver.

The experiments began in an attempt to extract aluminum chemically from common clay and cryolite. This was accomplished in a novel manner, and the operators obtained thereby metallic aluminum, chemically pure. Their method was based upon the theory of substitution and smelting the ore in a water-jacketed steel furnace, a crucible being useless to resist the strong fluoride fluxes.

When the mass was quite liquid it was conveyed into a converter, or covered slag pot holding about 400 pounds, and the aluminum extracted therefrom by a syphon tap. The slag was returned to the furnace, serving the purpose of a flux with more ore. This direct continuous process obviated the necessity of the usual costly intermediary elements, and made the aluminum about as cheap as copper.

The Longest Run on Record of a Spiegel Furnace.

Mr. G. C. Stone, of the New Jersey Zinc & Iron Company, Newark, N. J., reports that one of their two furnaces recently blew out after the longest blast ever made at the works, and the longest run on spiegel that has yet been made, being three years and two days. The product was:

	Tons.	Cwt.	Pounds.
First year	3,340	10	70
Second year	3,443	13	57
Third year	3,090	8	79
Total	9,874	12	94

The average yield of ore was only 31·5 per cent. The spiegel averaged 19·55 per cent. manganese. It required 2 tons, 9 cwt., 22 pounds of coal to the ton of iron, and made about 6,000 pounds slag to each ton of iron.

IRON TRADE REVIEW

A JOURNAL OF THE
IRON AND STEEL INDUSTRY, THE MACHINERY TRADE AND KINDRED INTERESTS.
PUBLISHED EVERY THURSDAY BY THE
CLEVELAND PRINTING AND PUBLISHING CO.
Corner St. Clair and Wood Streets, Cleveland, O.
W. M. DAY, Pres't. F. J. STARAL, Sec'y & Treas.
A. WINTEMBERG, Sup't.

W. M. DAY, Editor.
FELIX ROSENBERG, Associate Editor.
E. C. PECHIN, M. E., Special Contributor.
R. S. EVANS, Special Western Representative.

Articles written by Mr. Pechin will be signed with his initial, nd only for articles so signed will he be responsible.

INDUSTRIAL ITEMS always welcome.
COMMUNICATIONS from practical men cordially solicited.
IN WRITING to our advertisers, please state that you saw their advertisement in this journal.

TERMS: Iron Trade Review (weekly) $3.00 per year.
Western Machinist (semi-monthly) $1.00 a year.
Advertising Rates Furnished on Application.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER.

CLEVELAND, O., JULY 19, 1888.

THE GREAT LAKES STEAMSHIP CO.

Lake Superior iron ore producers and sellers are still watching with much interest the progress of the project to build a fleet of high-class steel ore-carriers, and to provide the necessary terminal and transportation facilities at Sandusky in connection therewith. Naturally the scheme has met with the vigorous opposition of the vessel-owners, and their attorney, Colonel R. C. Parsons, of Cleveland, has published an "Open Letter" to English investors warning them against throwing away their money on a visionary scheme. He has also given to the press an interview, in which he reiterates the charges made in his pamphlet and, in addition, casts discredit upon the financial standing of Mr. Matthew Robins, of London, who has been investigating the scheme on behalf of his English clients.

So long as Colonel Parsons's attacks were directed against the feasibility of the project itself, Mr. Robins remained silent; but when his own credit was impugned, he immediately took measures to brand the imputation as false in every particular. This he most effectively did at a meeting of prominent citizens of Sandusky and Northern Ohio, held at Sandusky last Friday. To this meeting Colonel Parsons was invited, but at the last moment sent a letter stating that his clients did not deem it necessary for him to attend. As Mr. Robins's statement was taken down in shorthand, and as we shall take occasion hereafter to present the material portions of it to the readers of the IRON TRADE REVIEW, it will suffice for the present to say that Mr. Robins established the high character of his financial responsibility and connections to the satisfaction of all present, and at the same time expressed his full confidence in the practicability of the scheme. He left little doubt in the minds of his hearers that the money would be forthcoming at the proper time.

NATURAL GAS IN CLEVELAND.

After numerous experiments, all resulting unsatisfactorily, natural gas has at last been struck near Cleveland, in what seems to be unusually abundant supply. The well is located between the Cleveland & Pittsburgh and Cleveland & Canton railway tracks, a short distance south of the city limits. The gas was found at a depth of about 1,800 feet, and the pressure is variously estimated at from 400 to 700 pounds to the square inch. A column of gas and salt-water has been shooting 50 or 60 feet into the air ever since the vein was struck, last Saturday, with no visible diminution in quantity. At least three more wells will be immediately sunk in proximity to the "spouter."

This means a great deal for Cleveland, if the supply holds out. The well is situated within a mile or two from the Cleveland Rolling Mill Company's and the Union Rolling Mill Company's works, as well as other large manufactories, and there will be no difficulty in piping it; but it is stated that the former company will probably drill wells of its own. Altogether, the new discovery, setting at naught, as it does, the predictions of experts, is the sensation of the day, and may mean a new epoch in Cleveland's industrial history.

THE GREAT IRON LOCK-OUT.

Another week has brought a new phase of the iron lock-out. Gradually the signatures to the Amalgamated Association's scale are coming in, though the general body of manufacturers still affirm most strenuously that the situation is practically unchanged. The following is believed to be a correct list of the firms that have already signed the scale, and of those that have not:

FIRMS THAT HAVE SIGNED.	FIRMS THAT HAVE NOT SIGNED.
Pittsburgh, Pa.:	Pittsburgh, Pa.:
Oliver Bros. & Phillips.	Chess, Smith & Co.
Carnegie, Phipps & Co.	A. M. Byers & Co.
Republic Iron Co.	Dilworth, Porter & Co.
Moorhead Bros. & Co.	Graff, Bennett & Co.
Jones & Laughlins.	Phillips, Nimick & Co.
Singer, Nimick & Co.*	I. Painter & Sons.
Linden Steel Co.	I. W. Friend & Co.
Apollo, Pa.:	Long & Co.
Apollo Iron & Steel Co.	Brown & Co.
Aurora, Ind.:	Elba Iron & Bolt Co.
Aurora Iron & Steel Co.	Keystone Iron Co.
Toledo, O.:	Moorhead, McLean & Co.
Maumee Iron Co.	W. J. Hammond & Sons.
Mingo Junction, O.:	Henry Lloyd Sons.
Mingo Junction Iron & Steel Co.	Zug & Co.
New Philadelphia, O.:	Schoenberger & Co.
New Philadelphia Iron Co.	Wm. Clark & Sons.
McKeesport, Pa:	Spang, Chalfant & Co.
National Rolling Mill Co.	Lindsay & McCutchon.
Cleveland, O.:	Pittsburgh Forge & Iron Co.
Cleveland Hardware Co.	McKeesport, Pa.:
Akron, O.:	National Tube Works Co.
Akron Iron Co.	W. D. Wood & Co.
Chattanooga, Tenn.:	Youngstown, O.:
Lookout Iron Co.	Brown, Bonnell & Co.
Findlay, O.:	Mahoning Valley Iron Co.
Findlay Rolling Mill Co.	McCurdy & Co.
Newport, Ky.:	Youngstown Rolling Mill Co.
Newport Iron & Steel Co.	Niles, O.:
Ironton, O.:	Trumbull Iron Co.
Lawrence Iron Co.	Cleveland, O.:
Struthers, O.:	Union Rolling Mill Co.
Summers Bros. & Co.	
New Albany, Ind.:	
New Albany Structural Iron Co.	
Kittanning, Pa.:	
Kittanning Iron Co.	
Chicago, Ill.:	
North Chicago Rolling Mill Co.	
Niles, O.:	
Falcon Iron & Nail Co.	
Lynchburgh, Pa.:	
Jennings, Beal & Co.	
Gate City, Ala:	
Gate City Iron Works.	

These, with one or two possibly omitted, bring the total of signing firms up to over 25, and of those that have not signed to upwards of 30.

Reports have gained currency within the past few days that the Western Iron Association was approaching disruption, and that President Keating was about to resign. It can be said that President Keating will not resign, but it is not unlikely that there will be a reorganization of the Association, with a view to strengthening the forfeit clause, and that the present members of the Association, west of Pittsburgh, will unite in forming a new organization independent of Pittsburgh.

A HALF-YEAR'S FAILURES.

The statistics of commercial failures in the United States are much more complete than those collected in Great Britain. While, in this country, estimates of assets and liabilities are given, thus affording a basis of calculation as to the percentage of large and small failures, in Great Britain the statisticians seem content to collect simply the number, classifying them merely as wholesale and retail. From figures before us, we observe that, in both countries, the number of failures for the first half of 1888 is in excess of the number reported for the corresponding period of 1887. The totals are: Great Britain, 4,628; United States and Canada, 6,166. This is as against 5,705 for the first half of 1887, in the United States, with no report from Great Britain. It would be interesting to learn what relation the above figures sustain to the total number of traders in the respective countries, but the imperfect method of collection in Great Britain renders this impossible.

Bradstreet's, upon which the American public depends for this information, finds, in its current issue, that while 86 or 87 per cent. of the failures were those who were possessed of but $5,000 capital or less, only from 61 to 64 per cent. of the total number failing failed with liabilities of $5,000 or less, but 80 per cent. on the average having liabilities of nearly $10,000 or less. The number with liabilities as high as $100,000 and upward is quite small, aggregating but 1 per cent., and the number with liabilities of $500,000 and over is between two-tenths and one tenth of 1 per cent.

*Pay the scale, but do not recognize the Amalgamated Association.

THE IRON DISTRICT OF ALABAMA.—IV.

COAL AND COKE.

At one of the sessions of the late meeting of the Institute of Mining Engineers, at Birmingham, the character of Alabama coals and cokes came up for consideration. When the statement was made that the coke was not what it should be, either in its mechanical condition or in freedom from impurities, there was an unqualified assent by several Alabama furnace makers present, and, that there was a pressing necessity for its improvement, was admitted.

Various analyses of coals presented, seemed to show that it was not the fault of the coal, but improper manipulation of it.

There would seem to be a ready explanation, why there has been so much poor coke in the past.

For several years there has been a constant and most pressing demand, for a great deal more coke than could be furnished. Furnaces were built or enlarged, before coal mines were opened, or coke ovens provided. The heavy demand and full prices received, called for the largest possible output, and carried with it rapid and careless mining, and too rapid and faulty coking, giving much soft and dirty coke, which in the furnace caused large consumption and irregular product. It was stated on what ought to have been good authority, that in the past, many furnaces had to charge up two tons of coke to the ton of iron, to cover purchasing weights.

One well-known furnace manager said that while his charging showed 1½, he was obliged to enter up 1¾ tons to cover waste in the shape of soft coke and black ends.

What this waste is, anyone can appreciate by going into almost any stock house and seeing the amount of "small" that goes over the dump pile.

In the discussion that took place, the writer expressed certain views, as the result of rather a full personal experience, considerable investigation, and many earnest conversations with other iron masters, and which he ventures to briefly refer to here.

There are two serious objections to the use of soft coke, one of a chemical nature, and the other mechanical.

Sir Lowthian Bell has very clearly shown us what takes place in a blast furnace.

The solvent effect of carbonic acid gas, in the upper part of the furnace, upon soft coke, is very decided. While hard coke is scarcely affected, on soft coke, a marked effect takes place, resulting in a positive loss of nearly six per cent. in the soft, over the hard. In soft coke, carbon that ought to be availabie in the zone of fusion, is wasted in the upper part of the furnace. Mr. John Fulton covers the ground in the following: "Every pound of coke consumed by carbonic acid gas in the upper part of the furnace, is a double loss, by a reduction of the temperature where the action takes place, and the loss of fuel, which should have been burned near the tuyeres." The use of soft and small coke is attended with a mechanical disadvantage.

It goes without saying, that just in proportion as the internal operations in the upper part of the furnace are regular, is the value and size of the output below. In a 75′ to 80′ furnace, the reduction of the ore should be practically completed in the first 20 to 25′ from the top, and at this point the ore will, or ought to be, in a state of powder. Of course, in this zone, the reduction has been effected by carbonic oxide, generated below, but the reduction is hastened or retarded by the rapidity or slowness with which the volume of gas has passed over the ore. The carbon impregnation, splitting up the ore, commences early, at a low temperature. In the zone, next below, at a considerably higher temperature, the limestone loses its carbonic acid, and becomes lime, a brittle, friable substance, which rapidly disintegrates on the rapid downward passage of the stock.

The only interstices that occur, to admit of the passage upwards of the blast, are those caused by the coke.

If every piece of coke could be put into the furnace, of the same hardness and size, the openings in the stock would be practically alike, and the gas would ascend with uniformity, and produce the same effect at the same time upon all the material, that it came in contact with. Hard coke comes in front of the tuyeres, in good form to perform its work there. Soft coke, undoubtedly, suffers very considerably by abrasion in its descent. The soft edges are rubbed off, and running into interstices, tend to close them, joining with the fine ore and

lime, a packing effect goes on. The action of the blast becomes more or less irregular—going with greater freedom through the larger openings, and with lesser, through, or possibly avoiding, the packed parts. This packing may so occur as to have one portion of the descending stock properly prepared, while another portion is largely unaffected, and coming down to the fusion zone only partially reduced, completely changes normal conditions there,and in furnace parlance "throws the furnace off," if doing nothing worse. It seems highly probable, that collections of fine stock have much to do with "scaffolds"—as if from any cause heat is thrown into the upper sections of the furnace, and this stuff becomes pasty, it more readily agglomerates and affixes itself to the walls.

The difficulty with poor coke commences in the stock-house. Soft coke, dropping from cars on high trestles, crushes more or less upon contact with the pile below, the small remains in the centre of the stock pile, while the lumps roll to the outside. The fillers on one turn, necessarily, load from the outside, and mainly lump coke—the next turn get to the centre of the pile, and load coke that must go into the furnace, mainly small. Charging in this way forms layers in the furnace totally different in character and action. At his late visit, the writer saw precisely this thing going on at several furnaces, and there is no coke furnace manager living, who is not painfully conscious of the trouble arising from this cause. Even with the best coke, this occurs to a certain extent—intensified, in soft coke, to the point of danger.

The avoidance of these objectionable features and results is of more importance to the South, than to any other district. Without a present home demand for large quantities of mill irons, and with heavy freight rates to points of large consumption, it is essential to proper furnace profits, that as large a percentage as possible, of foundry iron, should be made. No furnace manager can hold his furnace on foundry iron, with variable fuel.

Soft and dirty coke hits hard in every direction; larger wastage, increased consumption, irregularity in working, lower grades of iron, smaller output, and increased cost all along the line.

If any Southern manager has any cause from his own experience and observation to oppose the above conclusions, the writer will be under many obligations if he will make it known. What we are all after is the truth.

With the exception of one small plant, at Coalburg, all of the coke ovens in Alabama, as far as the writer has been informed, are of the bee-hive pattern. With the millions of dollars expended in all directions, there seems to have been no serious effort made to ascertain whether there was any better or cheaper method of turning coal into coke, than by following the beaten path. During the past season an experimental plant was erected by Mr. Koener, at Jasper, under the auspices of the Sheffield & Birmingham C., I. & R. R. Co., which, unfortunately, has never been tested. It is modeled somewhat after the Bauer system, which has proved a marked success on the continent.

There is no question but that, with proper handling, the Alabama coals will make first-class coke, and it is an engineer's or manager's bounden duty not merely to make a good article, but the *very best* that can be made, from the materials furnished by nature. He ought to find out, whethre a little more outlay at the mine and oven, may not result in much more income from the blast furnace.

The plant being erected at Coalburg, by the Sloss Iron & Steel Company, requires special notice.

The oven is a long-arched flue, 36′ in length, 7′ 9″ wide in front, and 7′ 3″ in the rear, and 5′ high. An expansion space is left between the front and main arch. The door frames are made of iron, built up with brick, and the doors readily open when the charge is to be drawn.

The air is admitted through flues, on each side, running the length of the open, by openings arranged to produce uniform combustion of the gas, the whole length. The products of combustion go off through a low stack at the far end.

As worked at present, 12 tons of coal are charged every 48 hours through two charging holes on top, which are then closed. The coke, when made, is drenched, either in or outside of the oven, as may be desired, preferably inside, and then pulled out by machinery, directly into the railroad car, standing on a sunken track. The writer was fortunate enough to see a drawing. In less than 10 minutes from the time the power was applied, the whole charge was in the car, in curious contrast to a negro opposite, at a bee-hive oven, who, in the broiling sun, and with great physical exertion, had succeeded in the same time in loosening and drawing out about a cubic foot of coke. The coke was discharged in large pieces, making scarcely any small; it was bright, strong and resonant, with no black ends, and was by long odds the best looking coke that the writer had seen in the whole district. In a letter, just received, from the general superintendent, he says that the ovens are entirely satisfactory, and the coke better than when the writer saw it. The oven is ready at once for recharging, and starts off much hotter than the bee-hive—a decided advantage. It should be stated that the coal is crushed before charging, there being no pieces larger than walnuts.

These ovens are designed by Mr. Thomas, a Welshman by birth, but, if we are not mistaken, lately of Illinois.

As to a further advantage to be gained by washing the coal, this must depend upon circumstances. If coal has parting seams of slate, which cannot be kept out of it in mining, and this slate, as it generally does, carries the sulphur in the form of pyrites, unquestionably a great gain in quality may result from washing. One objection, in the past, and, to a certain extent a fair one, has been the loss in the shape of powdery coal carried off, but plants are now in successful operation, both here and abroad, that claim to have entirely overcome this difficulty. It is largely a question of figures; if by washing, a quality of coke is obtained that commands a higher price in the market, or that so works in the furnaces as to completely offset the cost of washing, it ought to be done, with one reservation of importance, in some localities—if you have the water. As to crushing there can be no question—the evidence, the world over, is that better coke is had by doing this. Considerable light can be thrown on the value of washing, by a careful examination of the following analyses:

By M. A. Brainerd :*

	1.	2.
Moisture	.165	.170
Volatile matter	1.190	1.179
Fixed carbon	86.733	89.163
Sulphur	1.081	0.858
Ash	10.820	8.660

No. 1—Stock pile, Ensley—Tennessee C., I. & R. Co.
No. 2—Stock pile, Birmingham—Sloss I. & S. Co.

Messrs. A. S. McCreath & E. V. d' Invilliers.†

	1.	2.	3.	4.
Water	.192	.130	.180	.128
Volatile matter	.758	1.130	.640	.685
Fixed carbon	88.875	86.478	89.164	84.678
Sulphur	1.182	1.049	.670	1.879
Ash	8.973	11.213	9.346	12.630

No. 1—Mary Pratt stock pile—Pratt seam.
No. 2—Sloss ovens at furnace—Pratt seam.
No. 3—Woodward furnace stock pile—Pratt seam.
No. 4—Williamson furnace stock pile—Pratt seam Coalburg.

They say the superiority of No. 3, as shown by the analyses, is no doubt due more to the greater care taken in the preparation of the coal for coking, than to any inherent improvement in the quality of the coal in this part of the field.

The above analyses pretty clearly indicate that any of these cokes would have been greatly improved by previous washing of the coal. Where slate partings carrying sulphur occur in coal, sulphur in the coke is necessarily an unknown quantity, because one man mines carefully, excluding the slate, and another puts it all in. In a furnace running on gray iron, sulphur can only be kept out of the iron by lime, and an unknown increase of sulphur, without increased lime, will certainly tend to give close iron. The Birmingham ores ought to be smelted with a much lower average than 1¾, or even 1½ tons of coke, and every quarter of a ton of coke cut off, means 50 cents saved in coke alone.

Favored as Alabama is, and cheaply as she can make iron, she will possibly be threatened in the near future with a formidable competition. The railroads now rapidly building through Kentucky and West Virginia, open up a long section of country, where similar geologic conditions exist, viz.: the red ore on one side and coking coal on the other, with high grade brown ores near by, and Cranberry and other Bessemer ores within reach, and many miles nearer to great markets. The superior excellence of the coking coals of this new region is now beyond question. The analysis given by Mr. McCreath, representing an average of several samples, speaks for itself:

Water	.347
Volatile matter	.757
Fixed carbon	92.550
Sulphur	.597
Ash	5.749

Alabama can no longer afford to use dirty or poorly-made coke, when she can have a high-grade pure fuel from the warrior field.

The various analyses published of the Cahaba field, show a remarkably pure coal, which ought to give it a coke of great excellence. At Blockton, some experiments are being made with the bee-hive oven, by raising the oven-roof much higher, and in some ovens, in admitting the air through the flues on the side. Every bee-hive oven in the district will work better with this construction. The Longdale Company, in coking the New River (W. Va.) coal, found great advantage in building in this way. The Thomas oven ought to handle the Cahaba coal to perfection. Sheffield, Florence, Gadsden and Anniston, are particularly interested in having the best coke attainable, as every furnaceman prefers to pay freight on fixed carbon, rather than on ash, sulphur and black ends.

E. C. PECHIN.

CLEVELAND, July 18, 1888.

*Paper read at Birmingham meeting of Institute of Mining Engineers, 1888.

†Transactions Institute of Mining Engineers, Vol. XV, Page 734.

LAKE SUPERIOR IRON NOTES.

Special Correspondence to the IRON TRADE REVIEW.

FLORENCE, Wis., July 16.—The aggregate amount of ore shipped by lake from the iron mines of the Lake Superior country, up to the close of the past shipping week was 1,350,387 tons, a decrease of about 175,000 tons as compared with last season. The following is a comparative statement of the shipments by districts:

District.	1888.	1887.
Marquette	510,951	659,600
Menominee	347,536	420,686
Gogebic	393,814	337,638
Vermilion	98,086	108,562
Totals	1,350,387	1,526,486

The Youngstown Mining Company, composed of iron manufacturers of Youngstown, Ohio, has notified the owners of the land on which its mine is located that it will surrender its lease and abandon the mine, unless concessions in regard to royalty are granted. The mine is located at Crystal Falls, Mich. It is probable that there will be a general movement looking toward a reduction in royalties before long. Well-posted mining men declare that the royalties paid at present are excessive, and must be reduced in order to allow the mining companies to live.

The St. Clair Bros., of Ishpeming, have sold their interest in the Mitchell and Beaufort mines to F. Braastad, who has been interested in the properties for several years. The St. Clair brothers were the principal shareholders of the Winthrop Hematite Company, which owns the two mines.

The Negaunee & Palmer Railroad Company has filed articles of association. The capital stock of the corporation, which is to be continued 1,000 years, is $100,000, divided into 1,000 shares of $100 each. It is intended to construct the railway (after which the company is named) from the city of Negaunee to the village of Palmer, in the county of Marquette, and to the iron mines in that vicinity. The length of the road will be ten miles.

Most of the mines in the Marquette district have made a reduction in wages. Miners are getting 20 cents per day less than formerly, and other employes have been cut in proportion.

There has been no change of importance in the situation at the Chapin mine. The mine continues to send a fair amount of ore forward to Escanaba, and the working force is about the same as it has been since the reduction was made last Spring.

Very active exploratory operations are being carried on northwest of the Republic mine, in the Marquette district, nine or ten different exploring camps being at work. The discovery of the St. Clair mine, between three and four miles northwest of Republic, tends to show that the great Republic vein, instead of crossing the Michigamme river, as has always been supposed, follows the bend of that stream. The St. Clair mine, which is quite a valuable one, will shortly commence shipping, and other mines are likely to be found in the new territory.

The Ashland, Aurora, Brotherton, Colby, Germania, Iron Belt, Iron King, Norrie and Pabst were the only mines that shipped ore from Ashland last week. The two rival ore docks at Ashland appear to be doing a pretty even business. During the past week the Lake Shore Railway forwarded 25,700 tons of ore and the Wisconsin Central Railway 22,574 tons. The former has the most shippers, but the Ashland and Colby mines, the two largest shippers in the Gogebic district, via Ashland, are sending their entire products to the Central docks.

AN ocean cable to be the longest in the world is to be laid from Canada to Australia, 7,500 miles.

THE CHALK AGE OF MECHANICAL ENGINEERING—III.*

I find that my time will not permit a description of all the tools of the old machine shop, few and crude as they were.

The old bull lathe, with the wooden shears (iron strapped) and the slide rest, and hand turning tools that belonged to it, have either been changed beyond recognition or buried under the scrap heap of the past. Neither can I describe even a few of the innumerable contrivances we were compelled to make, in order that our scant tools could be made to do work which the new and improved tools of to-day would make nothing of doing. But all this had its value. When every day brought a new necessity, each day as well brought a new device for its accomplishment, until the machinist who learned his trade in those days, and in shops that had but few tools, had resources of experience and of expedients that gave him courage to attempt almost anything. It is a great pity that there has not been preserved, by means of cuts and drawings, some of these exceedingly ingenious makeshifts in the way of impromptu boring machines, facing off tools, drilling apparatus, and screw-cutting atttachments on engine lathes, etc. Many of them were curiosities in which odd wheels picked out of the scrap heap, joined with jiggers of all kinds and shapes, tied with clamps and long bolts made to do service as short ones, by having strung on them as washers a lot of worn-out nuts, the whole turned with a crank by hand, or by a rope, which, turning several corners, reaches somewhere a revolving pulley for the required power.

New and improved tools have done away for the necessity of such contrivances, and they have also done away, I fear, with the skill and ingenuity then required in the workman. There were giants in those days, in the way of workmen, who, with only a hammer, a chisel, and a file, could fit up in elegant style the strap joints and connecting rods which to-day come finished and polished from the machine tools without the aid of either. These were the days when the ways of lathes were chipped and filed, as were the guides for steam engines, and, indeed, all plain or dressed parts of machines.

I have not thus rehearsed the story of the "chalk age" simply to tell you what pluck, energy, and untiring industry then accomplished, but to give you an idea of the superior advantages you who are now before me, and who are seeking to become skilled in the mechanic arts, possess over those who have traveled over this road before you.

If, with the same high aims, the same undaunted courage, you start on this journey, aided as you are by all these fortunate surroundings, there will be no reason why the coming engineers may, not at the last, lay down their work with the same feeling of satisfaction as do the engineers of the present, as they look back on what has been accomplished in the half century just passed. And need I say that if the world's progress is to be aided by a corresponding epoch of great inventions, if it is to have its civilization, its commerce, its industrial pursuits, as well as its education and the general welfare of all, advanced with the same steady, onward march in the years that are to come as it has had in the years that have gone, it will be to the engineers which the technical institutes, the manual training schools, are to furnish, we must look for its accomplishment.

If you are inclined to think lightly of the task that is before you, if you are inclined to think disparagingly of the artisans and engineers of the past, and of what they have done, just, for a moment, think of what has been accomplished by them in the fifty years or so just gone.

Of course, you cannot remember the time when there were no railroads, no locomotives, no steamships, no telegraph wires on land or cables under the sea, or scarce of the time when the telephone had no existence, except in the imagination of Shakespeare when he spoke "of airy sounds, that syllable men's names."

You can scarce conceive of the time when there were not, as there now is, immense manufacturing establishments all over this land, in which everything, from the most delicate screw within your watch to the most ponderous engine, is turned out by machinery. For a description of the time in which all these things were unknown, you have not to listen to the "tales of a grandfather." Your fathers' remembrance will serve as well to enlighten you.

The world will never know, for it will never stop to consider, how much it owes to the inventor, the artisan, and the engineer of the past. While some of them lie in honored sepulchres and their memory is revered, vast numbers of these lie buried in unknown graves. Many sleep their last sleep in the village graveyard on the hill which overlooks the scene of their life's struggles. Some yet live, leading quiet, plodding lives, who in one way or another, by their genius, their industry, and perseverance, have done much to bring about the wonderful changes of which I speak. Here and there, as managers of vast iron and steel works, mines, and manufactories, which their genius created, may be seen moving about, quiet, thoughtful men, who, were they not pointed out to you, you would never dream were the originators of the vast industries they control.

In many instances most marvelous changes have taken place within your remembrance. There are places now busy with the hum of industry, whose towering chimneys blacken the air with their belching clouds of smoke, where the clamor of clashing wheels and shrieking whistles fill the air with strange sounds, and where the measured beat of immense steam hammers make all about to tremble; places where before a hundred fiery furnaces, relays of swarthy workmen move to and fro, charging into their hot mouths or drawing from their fiery throats huge ingots of iron or steel, conveying them to gaping shears whose iron jaws bite them asunder, or to remorseless rolls which mash and mold them through unyielding grooves, and from out which the hissing, tortured metal writhes and twists like some great reptile in agony. If you do but follow the heated metal as it is drawn back and forward, pushed here and there, turned over and about as it would seem by unseen hands, helpless and as yielding as the clay in the hands of the potter, you will soon find it resting on its hot bed, a finished rail that shall bear upon its upturned head the traffic of the nation. And all this shall be upon what was, within your memory, a green meadow, beside which there flowed a placid river, and where the most energetic action within one's vision was the slowly moving yoke of oxen which on the hillside beyond leisurely dragged a plow; or the boy, sitting on the projecting trunk of a dead tree, watching with patience the too restful floating cork which even the passing breeze was too gentle to disturb with a rippling wave.

I can point you places where, but a few years ago, naught was to be seen but a worn-out cotton plantation, with here and there a tumble-down log cabin without doors or windows, ornamented at one end by a jagged stick chimney, and at the other with a coon skin stretched out to dry; and where the oldest and almost only inhabitant might have been seen sitting on the top rail of a worm-eaten fence, smoking leisurely a cob pipe, watching the while with half-closed eye the lazy, floating buzzard that circles in the sky above him.

Go there to-day, and note the changes that have come over the scene. Over lines of steel which reach from the storm-tossed waves of Erie to where the dull swash of the waters of the Gulf die away amid the lagoons of the South, from the sands washed by the Atlantic to the rocks of the Rockies, cars freighted with the product of many climes pass to and fro. From beneath the soil once plowed by the slave, there now comes to the sunlight, thousands of tons of coal to feed fires that go out by day or by night, that give breath to panting engines, which in turn set aglow vast furnaces that light up the midnight hours so recently devoted to silence and to solitude. Along the vanishing furrows the plowman had left, lines of street cars are to be seen; on all sides, mills and manufactories give a hum of industry all unknown before. Churches, school houses, and costly dwellings have sprung up like magic amid the stubble fields of the past, and over the scene where ignorance and indolence so lately held undisputed sway, manufactures have bred commerce, and busy, whirling wheels have quickened the life blood of trade, until through every artery and vein it pulsates and flows with a force and vigor never before known beneath a Southern sun. What has brought about this change? Who was it that waved above this hopeless spot the magic wand that woke it into life, and thrilled it into impulsive energy? Need I tell you it was the engineers, and largely so the mechanical engineers? Who are the mechanical engineers of our country? They are men seldom seen on any platform, men who are seldom heard in any public assembly, and whose names adorn no printed page. They are men whose lives have been spent amid the rumble of whirling wheels, the roar of flaming furnaces, the hum of spindles, and the click of flying shuttles. Among them are many whose forms have grown bent by labor at the bench or lathe, whose eyes have grown dim by the feeble light of the workman's lamp, whose gray hairs and worn looks speak of hours of toil and nights of restless tossing, as they studied and dreamed on some then unsolved problem which, worked out later, has benefited all the world. They it is who have invented, worked out, and brought to their present state of perfection the steam engines as shown in the locomotive, the steamship and the mill. They have devised and built the tools and machines that have made comforts possible in the poorest homes, luxuries in the richest. Their labors and their lives have advanced civilization, education, and all good things that have lifted the world up higher, made it more comfortable, more enjoyable, and better suited for the happiness of all in it; and I feel that I would not have done my duty at this time, to them and their memory, did I not say all honor to the mechanical engineers of the "chalk age."

*An address delivered before the Section of Mechanical Engineering, Sibley College, Cornell University, Ithaca, N. Y., by J. F. Holloway, of New York.

Undervalued Steel Blooms.

A large quantity of imported steel blooms were sold on the 28th in New Albany, Ind., by the Custom authorities, for duties, freight, etc. This lot was a shipment on a sale of 5,000 tons made some time since by Andres Joachams, of Charleroi, Belgium, to the New Albany Rail Mill Company. The rail mill bought the blooms at a very low price, through a local firm, acting as agent for the shipper, and the sample lot of about 20 tons came through the Custom House, undervalued, but the surveyor, knowing it to be only a sample, allowed it to pass, suspecting at the same time some sharp trick. When the first regular shipment of about 400 tons came through, it was likewise undervalued, and was seized by the authorities for full duty, the rail mill having refused to pay the draft and receive the blooms, perceiving something crooked. Mr. Gathright, surveyor of the the port of Louisville, states that Joachams has systematically defrauded numerous buyers through the country, the principal victim being a firm in Terre Haute, Ind., who, upon making a contract with Joachams for a heavy purchase of blooms, deposited a letter of credit in England, against which the shipper could draw with bill of lading attached. On each shipment after the papers had been officially approved, he would raise the amounts on the drafts, and, in this way, secured all the funds before half the goods were shipped. The entire lot in question was purchased by the Paddock-Hawley Iron Company, of St. Louis, for $20.30 per ton, which is about $6 below the market price, making about $7,000 including duty, charges and freight. The frauds of Joachams were first detected at the Louisville Custom House, and immediately reported to headquarters.

Machine Riveting.

Iron & Steel Trades Journal, London.

Machine riveting continues to make progress, and there are now several very useful apparatus on the market. It is no longer doubted that machine riveting is the best. During a recent visit to the Clyde we carefully watched the rivetting machines at work, and also closely examined the work done by the hammers, and were fully satisfied that the squeeze given by the machine tends to press up the shank of the rivet throughout its entire length, thus more effectually filling up the hole. The hammer only makes a succession of dents on the rivet end. In bridge-building, as well as in ship-building yards, the machine is superseding the hammer. In the matter of heating rivets there is, we think, room for improvement. In the common portable hearth it is almost impossible to get boys to heat more than the points of the rivets, consequently, there is less probability of the shanks being pressed full into the holes, and the rivets have less contraction when cooling. A reverberatory furnace where the rivets could be heated all over would be an improvement, and not being in contact with the fuel, would be less likely to be burnt.

A PROCESS of reducing iron ores has been patented by Mr. Gustaf M. Westman, of Stockholm, Sweden. In addition to the reducing furnace, regenerating or carburetting furnaces are employed, with a circulating blast engine, affording means for reducing the ores by means of carbonic oxide, by passing the carbonic oxide through a charge of ore, drawing off the gases from the charge, and passing them over glowing coke, cooling the gases, and then superheating them, after which they are again passed over or through the ore to be reduced, thus saving fuel without injuring the quality of the product.

Industrial Notes

Blast Furnaces:—

The Gogebic Furnace Company, who operated the furnace at Iron River, Mich., in 1887 and part of 1888, has blown out the furnace and given up the lease to the owners, the iron River Furnace Company, of Fond du Lac, Wis.

The Ohio & Western Coal & Iron Company, of Columbus, Ohio, now has four blast furnaces, namely, Helen Furnace, at Orbiston, Hocking county, XX Furnace, at Shawnee, Perry county, and the two furnaces at Floodwood, Athens county, which have been completed this year. Lee Furnace, at Monday, Hocking county, has been dismantled. No iron has been made at any of these furnaces for many years.

For several months past the Glendon Iron Company, Easton, Pa., have been making brick from hot cinders that come from the furnace; recently the wages of the brick-makers were reduced and all of them quit work. The company notified all of their ore contractors in Williams township to stop delivering ore at the works on the 30th inst. It is thought that this means that the company have poor prospects of putting their four idle furnaces in blast.

Rolling Mills:—

The rail mill of the Cleveland Rolling Mill Co. is running double turn.

It is claimed that the rolling mills now being erected at Jasper, Ala., will be the largest and best equipped in the State.

Thomas Carlin's Sons bought all the mill machinery at the Graff, Bennett & Co. sale on Tuesday and Wednesday.—[American Manufacturer, Pittsburgh.

Many of the Pittsburgh mills, with those of McKeesport and Braddock, were damaged considerably by the flood of the past week. Work was entirely suspended at some establishments and nearly so at others.—[American Manufacturer.

Messrs. Lean & Blair, engineers and contractors of Pittsburgh, have contracted with the Union Rolling Mill Co., of Cleveland, for five large heating furnaces and a gas-producing plant complete. These mills have heretofore run on coal, but will change to gas.

The Reeves Iron Co., of Canal Dover, O., are constructing a regenerative gas furnace with the necessary gas producers, from plans furnished by Alex. Laughlin & Co., engineers, Cleveland, and upon its completion intend erecting another furnace immediately, for their eight-inch mill.

The Lukens Rolling Mills, Coatesville, Pa., Chas. Huston & Sons, proprietors, have just put in a new set of three-high rolls, 98x30, in place of 84x25, as heretofore. They also put a new cylinder of increased size, with Corliss valve gear, to their engine, which was formerly of the slide-valve pattern. All the work is now complete and running satisfactorily. Orders are reported plenty.

Steel Works:—

The firm of Hussey, Howe & Co., Limited, steel manufacturers at Pittsburgh, will shortly be dissolved, and an incorporated organization effected. J. W. Brown, who is now secretary and treasurer of the company, will probably be made chairman of the new organization.

The Harvey Steel Company is a new organization which is about to purchase a site for works at Jersey City, N. J. The company consists of H. A. Harvey, president; Theodore Sturgess, of the Oxford Iron & Nail Company, secretary; B. G. Clarke, of the Thomas Iron Company, and the Lackawanna Coal & Iron Company, treasurer; Mr. Percy R. Pyne, of Moses, Taylor & Co., being also interested in the concern. The company will build works to make steel under the patents of H. A. Harvey, who is well known as the inventor of machinery for the manufacture of cut and rolled wood screws.

Hardware:—

The Nimick & Brittan Manufacturing Co., Pittsburgh, have lately brought out "The House" automatic liquid door check and spring.

The St. Louis Vise & Tool Company has increased its capital stock from $5,300 to $30,000. Its assets are reported to be $47,661.78, and liabilities $15,781.64.

The Howe Scale Works, Rutland, Vt., sold at auction on the 12th inst. for $441,283. The sum includes the amount of liabilities ($201,133), and are assumed by the purchasers. The works were bought by a syndicate of seven Rutland men. The new owners will take possession within 60 days. Work will go on without interruption.

The Wichita (Kan.) Wire Nail Company are building a brick factory, 40x300 feet, with front projection 16x40 feet. The engine room will be 30x40 feet and one story high, the balance being two stories high with a basement 130 feet long under one wing. The capacity of the works will be between 20 and 40 tons of nails per day, in the keg. The company will draw its own wire.

The Universal Horseshoe Machine Company, at a recent meeting, increased their capital stock from $175,000 to $300,000. Their buildings at Anniston have been erected, and it will not be long before they will begin operations. They are preparing to make steel blooms themselves in the event of the Anniston Bloomary finding it impossible to keep them fully supplied with the raw material out of which their product is made.

The Freeman Wire Company, of St. Louis, hope to start up the Illinois Wire Mill, which they recently purchased, early in July. In addition to sizes adapted to barb wire manufacture, the company will make other sizes for which there is a local demand, hitherto cared for by outside manufacturers. A very considerable portion of the product will be used in the company's barb wire plant, which immediately adjoins the mill.

Fires in Iron Works:—

Portland, Oregon.—The foundry and machine shop belonging to John Atkinson.

Pittsburgh, Pa.—The puddling department of the works of the Keystone Iron Company. The loss will probably reach $100,000.

Lockport, N. Y.—The extensive rolling mills of Westernman & Sutcliff caught fire on the roof from one of the chimneys, and in a short time were totally destroyed. Loss, $50,000; insurance, $28,000.

South St. Louis.—The Jupiter Blast Furnace, operated by the Western Steel Company, was damaged by fire to the extent of about $25,000. A large amount of coal and coke and several Iron Mountain Railroad cars were also consumed.

New London, Conn.—A fire broke out in the repair shop of the New London Northern Railroad Company. The repair and machine shops were entirely destroyed, together with some lumber that was piled in the lots near the shops. Loss, $50,000; insurance $25,000.

Foundries:—

William Shimer, Son & Co., Freemansburg, have commenced the erection of a new foundry, 75x100 feet, which they hope to have finished by August 1st next. It will increase their capacity about 50 per cent.

The Sergeant Mfg. Company, capital stock, $25,000, have been chartered by B. E. Sergeant, George S. Sergeant and William T. Sergeant, to operate an iron foundry now erected at Greensboro, S. C.

Incorporated: The Lake Shore Foundry Company, of Chicago; capital stock, $15,000; to conduct a general foundry business. Incorporators—P. H. Meehan, R. D. Wardwell. The Composition Iron Company, of East St. Louis; capital stock, $500,000; for the manufacture of castings from composition and other metals. Incorporators—Gustav Fry, F. H. Ellis and Gustavus Heidel.

The Kansas City Foundry & Machine Company, who lately bought out the King Novelty Mfg. Company, of Independence, Mo., have now fully organized, with capital stock $40,000 paid up; T. B. Ray, president, T. C. Bradley, vice-president and treasurer. They are now building a new brick foundry and machine shop at Manchester, a suburb of Kansas City, and expect to be in active operation by August 1st.

Machine Shops:—

Incorporated: The Baker Engine & Machine Company, of Geneva, Ashtabula county, O., capital stock, $100,000.

The Lowell (Mass.) Machine Shop was incorporated in 1845, and its capital stock is $900,000. It employs 1,400 men; its weekly pay roll amounts to $11,000; the territory covered by its shops and boarding houses embraces nearly 13 acres, and it has the capacity to turn out the machinery for a mill of 40,000 spindles in three months.

Work has commenced on the new shops of the New York, Pennsylvania & Ohio Railroad at Brier Hill. The contract for their construction has been awarded to Drake, Shattuc & Co., of Pittsburgh, who also have the contract for double-tracking of the road from Youngstown to Cleveland. The company has bought 36 acres for the shops, and expects to have them ready to be occupied by November 1.

The Schenectady (N. Y.) Locomotive Works have nearly completed their new blacksmith shop, which is 75x350 feet. Locomotives are being built at the rate of 300 a year, and most of them are large ones. Four large consolidation are building for the New York Central.

A special dispatch from Altoona, Pa., under date of the 6th inst., reads as follows: "For some time past rumors have been afloat, in this city, that the Pennsylvania Railroad Company contemplate erecting a number of new shops here. The report has been confirmed, and in a short time work will be commenced. The statement is made that $285,000 has been appropriated to meet the expense assumed in the erection of various buildings.

Wage Matters:—

The strike in the Green Ridge Rolling Mill, at Scranton, Pa., against a 10 per cent. reduction has been decided in favor of the employes, and the mills resumed work on Monday last. The company will return to a monthly pay-day.

The employes of P. L. Kimberly & Co., Sharon, Pa., July 15, have accepted a proposition made by the firm to return to work, and the mill at this place is expected to resume work about July 23 after an idleness of four months. Repairs have been in progress for a week past.

The employees of the Beaver Falls Iron Company, of Beaver Falls, Pa., are on a strike. On receiving their pay recently, some of the workers found that their wages had been computed at the rate of $9.60 per ton, instead of $10.40, as paid heretofore. The men refused to accept the reduction and stopped work. About 150 men were thrown out of employment.

Three hundred employes of the Lake Erie Iron Company, Cleveland, have quit work, owing to the establishment of the monthly pay system. The men were employed in the nut and bolt department and but recently received notice of the monthly pay system. They were invited to sign an agreement to that effect, but refused and struck. Both sides claim to be firm.

Miscellaneous:—

The Avery Elevator Bucket Company, Cleveland, O., having purchased most or all the patents for seamless buckets, will increase its facilities for manufacture.

The King Iron Bridge & Manufacturing Co., of Cleveland have been awarded the contract for a three-truss and double canti-lever bridge over the Colorado river at $47,000.

The Secretary of State of Illinois has licensed the incorporation of the St. Louis Deadlock Brake Company, at East St. Louis, the same to have a capital stock of $25,000. The incorporators of the company are Nathaniel T. Lane, James V. S. Barrett and A. W. Taussig.

Sealed proposals will be received at the Office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock P. M., on the 28th day of July, 1888, for the labor and materials required in the erection and completion of the low temperature hot water heating and ventilating apparatus for the Postoffice, etc., at Lexington, Ky.

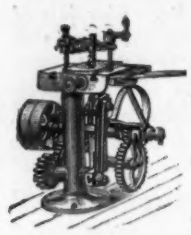
Sealed proposals will be received at the Office of the Supervising Architect, Treasury Department, Washington, D. C., until 3 o'clock P. M. on the 11th day of August, 1888, for the labor and materials required in the completion of the interior finish, including alterations, iron steps, vault doors, etc., for the U. S. Court House, Postoffice, etc., building at Louisville, Ky.

Akron is enjoying excellent industrial health these days, thank you. The almost unanimous affirmative vote on the fuel gas proposition, yesterday, ensures the establishment at once of a $200,000 plant for the manufacture of fuel and illuminating gas. And as usual, good fortune of this sort does not come along in single spies. The incorporations at the Secretary of State's office at Columbus, Tuesday, tell a cheerful story for Akron. The increase of the Akron Electric Light & Power Co.'s capital stock to $100,000; the incorporation of the Akron Street Railroad Co., with $200,000 stock, and of the Akron Woolen & Felt Co., capital stock $100,000, all in one day, are their own commentary on the steady and strong pulse of Akron's industrial life.—[Akron (O.) Beacon.

MIX & BOLAN, No. 520 Washington St.,
DAYTON, O., U. S. A.
Manufacturers of
Hardware Specialties.

SUPERIOR BOLT & RIVET CLIPPERS

Something new; will cut any bolt or rod of iron. Cutter being at side enabling user to slip cutter in a side in place of over end of back, and do not have to push to cut like a shear movement. Send for Circular. 34-1y



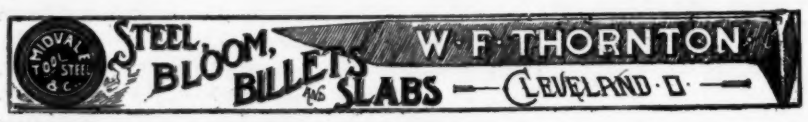
MORTON MANUFACTURING CO.
MANUFACTURERS OF
Morton's Lightning Keyway Cutters & Key Makers
MADE IN SIX SIZES.

Cutting Keyways and making Keys from 24 inches long down to the smallest work, with accuracy and rapidity.
Send for circulars and description.

Ja189 ROMEO, - - - MICH.

CONDIT, FULLER & CO.,
PIG & BAR IRON.
122 WATER STREET, Room 23. } CLEVELAND, O. { WAREHOUSE: 81 to 95 River St., cor. Main.

CLEVELAND ROLLING MILL CO.,
—MANUFACTURERS OF—
BESSEMER STEEL RAILS,
Blooms and Billets, Steel Angles, Forgings, Bar and Spring Steel, Steel Street Rails, Steel Oil Barrel Hoops, Wire of all kinds, Iron and Steel Boiler Plates, Galvanized and Black Sheet Iron, Corrugated Iron Roofing, Sheet Steel.



Dalliba, Corrigan & Co.,
Dealers in
IRON ORE AND PIG IRON.
101 St. Clair St., Rooms 20 to 22.
CLEVELAND, O.

Tuttle, Oglebay & Co.,
COMMISSION DEALERS IN
IRON ORES,
from Marquette, Gogebic and Menominee Districts.
CLEVELAND, O. 4f

WILLIAM F. JARVIS & CO.,
(Successors to CHAS. HIMROD & CO.)
DETROIT, MICH.,
Pig Iron.
Sales Agents for following brands Lake Superior Charcoal Iron:
Vulcan Furnace Co.
Detroit Iron Furnace Co.
Deer Lake Furnace Co.
Sales Agents for State of Michigan Tennessee Coal I. & R. R. Co.'s brands, viz.:
South Pittsburg, Sewanee, Alice and Ensley.
Brier Hill Iron and Coal Co.'s brands, viz.:
Brier Hill Scotch, Tod, Grace, and Bessemer, and Globe Iron Co., Jackson, Ohio.

E. C. POPE,
COMMISSION DEALER IN
Iron Ore, Pig Iron
AND METALS.
CLEVELAND, OHIO.

H. OUTHWAITE. W. G. POLLOCK.
J. H. OUTHWAITE & CO.,
Exclusive attention given to
Lake Superior and Menominee Range
Iron Ore.
CLEVELAND, OHIO.

Pickands, Mather & Co.
IRON ORE AND PIG IRON.
Corner Bank and Superior Sts.,
CLEVELAND, O.

H. E. COLLINS & CO.,
ORES AND METALS,
34 Lewis Block,
PITTSBURGH, PA.

Saml. L. Mather, Prest. & Treas. Fred. A. Morse, Sec'y.
Cleveland Iron Mining Co.,
Dealers in Iron Ores
from their own mines near Marquette, Lake Superior.
Rooms 4 & 5 Mercantile Bank Building,
CLEVELAND, O.

L. M. PITKIN, Pres't and Treas. F. L. CHAMBERLIN Sec'y.
Variety Iron Works Comp'y
BOILER MAKERS,
Machinists and Founders.
Shafts, Pulleys and Hangers a Specialty.
61 to 73 Scranton Ave. 81 Cleveland, O

COKE-
FOUNDRY COKE.
72-hour Connellsville Coke.
W. J. RAINEY.
Mercantile Bank Bldg., Cleveland

Pittsburgh & Wheeling Coal Co.,
Miners and Shippers of
OHIO STEAM COAL AND COKE.
Mines on the Cleveland, Lorain & Wheeling R. R. Capacity, 2,000 tons daily.
Office, 29 Mercantile Bank Building,
CLEVELAND, O.
Lake Shipping Point, Lorain, Ohio.

CLEVELAND BUSINESS DIRECTORY.

Bolt and Nut Works.

THE HOTCHKISS & UPSON CO. Manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws. 15

Boiler Makers.

SMITH & TEACHOUT—(Established 1857.) Boilers, Tanks, Stills, etc. 644 Broadway.

Bridge and Boiler Builders.

BUCKEYE BRIDGE AND BOILER WORKS, mfrs. of Arch and Truss Bridges, Boiler Tanks and Oil Stills. Bet. Wasson St., and Case Ave.

Belting, &c.

PARKIN & BOSWORTH, Agents for Shultz Raw Hide Belting, 9 & 11 South Water street.

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts. 41

Coal, Iron and Ore.

ANDREWS, HITCHCOCK & CO., Briar Hill Coal and Pig Iron. 101 St. Clair St. 81

BABCOCK, MORRIS & CO., —COAL.— Grand Arcade Building, Cleveland, O. 5

PICKANDS, MATHER & CO., Iron Ore and Pig Iron, Cor. Bank and Superior Sts. 61

SANGER, A. I., wholesale Scrap Iron, Nos. 173, 175 & 177 Merwin Street. 33

File Works.

INDUSTRY FILE WORKS, A. & H. Gough, manf'rs of Files and Rasps, equal to the best English file. Old files re-cut. All kinds of Job Grinding. Office and Works, 38 Columbus and 33 Winter street 13

Foundries

BOWLER & CO., Car wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

TAYLOR & BOGGIS FOUNDRY CO. Fine Gray Iron Castings. 65 to 73 Central Way.

FITZSIMONS WM. & SON, Rolling Mill and Machinery castings. Rolls a specialty. Nos. 426 to 432 Broadway. 64

Foundry Facings.

CLEVELAND FACING MILLS, Foundry Facings, Cor. Scranton & Carter Sts. 21

Hardware and Iron.

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water St.

CLEVELAND ROLLING MILL CO., manufacturers of Steel and Iron Wire and Steel Tire. 34

THE EBERHARD MF'G CO. manfrs of Carriage, Wagon and Saddlery Hardware. 25

Hardwood Lumber.

MARTIN & BARRISS, dealers in all kinds of Hardwood Lumber. 130 Central Way. 51

Lumber.

WOODS, JENKS & CO., manufacturers and dealers in Lumber, Lath, etc., 5 Carter street. 4

FISHER, WILSON & CO., Wholesale lumber dealers (pine & hardwood), rough and dressed lumber, timber, lath, shingles, etc. 47 Central Way. 82

POTTER, BIRDSALL & CO., dealers in rough and dressed lumber, lath and shingles. Yard and planing mill, 7 & 10 Carter St. 42

Machine Shops.

FORD, GEO. A., Machine Shop, Wood and Metal Patterns, and Experimental Machinery and General Jobbing. 15½ Frankfort St.

Steel Stamps and Stencils.

FLEHARTY, J. H. & Co., Rubber Stamps, Seals, Stencils. 92 Seneca street. 54

BUSINESS DIRECTORY.

Akron, O.

MONEIL, J. C. CO., Steam Boilers, Heavy Sheet Iron Work, &c. Repairing promptly executed.

TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc. 04

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street. 84

Alliance, O.

CHAPMAN G. L., builder of Engines and Machines Also Jobbing and Repairing.

Columbus, O.

CITY BOILER WORKS, manf's of Stationary, Portable, and Locomotive Steam Boilers. All work warranted. Borger Bros. & Co. 12

Canton, O.

NOVELTY IRON WORKS, Mill Work, Shafting, Engines, Imperial job printing press etc. 73

Hinckley, O.

ISHAM, W. S. Tin cans of every description Large job lots special prices. Correspondence solicited. 81

Meadville, Pa.

CURRY & CO. general jobbers in Castings of all kinds. 43

BUSINESS DIRECTORY.

Mansfield, O.

MANSFIELD STEAM BOILER WORKS, Man'frs of Steam Boilers, Oil and Water Tanks, and all kinds of Sheet Iron Work. 03

Niles, O.

REEVES BROS., Manufacturers of Boiler, Tank and Sheet Iron Work, etc. 64

Rochester, N. Y.

WOOD-WORKING MACHINERY. Send for Catalogue. J. S. Graham & Co. 43

GLEASON, WILLIAM, manufr. of Machinists' Tools, Lathes, Planers, and Pat. Gear Dressing Machines. 10 Brown's Rac.

Struthers, O.

SUMMERS BROS. & CO., manufacturers of Box Annealed Common and Refined Sheet Iron, and Superior Quality Shingle-Bands. 61

NILES BOILER WORKS.
MANUFACTURERS
STEAM BOILERS,
Blast Furnaces, Tanks, Stacks, Stills, Agitators, Car Tanks, etc.
Correspondence solicited.
REEVES BROS., Proprietors,
821y NILES, Trumbull Co., O.

ALEX. LAUGHLIN & CO.,
Engineers and Contractors,
WADE BUILDING, CLEVELAND, O.
Will contract to erect, equip and place in operation Rolling Mill Plants of every description.
Regenerative Gas Furnaces
—AND—
Artificial Gas Producers.
A SPECIAL FEATURE. ESTIMATES FURNISHED ON APPLICATION.

New "PRINCESS" Tricycle.
J. A. Weston & Co., Mfrs.
34 LOCK ST. - - SYRACUSE N. Y.
Catalogues & Discounts to the trade.
Also Manufacturers of
—PATENT—
Steel Wheels
for the trade.

VULCAN IRON WORKS.
THOS. MANNING, JR. & CO.,
MANUFACTURERS OF
STEAM ENGINES,
Air Compressors, Pneumatic Hoists, and General Machinery.
100 to 110 Merwin St., CLEVELAND, O.
53-1y

The Daisy Patent Natural Gas Burner
For all kinds of Stoves, Furnaces, and Open Grate. Will produce more heat than any other burners ever made. Manufactured by
Harmon, Gibbs & Co., - Corry, Pa.

MARKET REVIEW.

OFFICE OF IRON TRADE REVIEW.
CLEVELAND, O., WEDNESDAY EVENING, July 18, 1888.

Iron Ore.

The market is fairly active and, while the record of the week does not show a large aggregate in the amount of ore sold, there has been much lively inquiry for some grades of ore and some considerable covering. Bessemer hematites continue scarce, while non-Bessemers of that class are finding a ready market in the East, where for the first time, they are being extensively bought for mixture with native ores. This applies principally to New York and New Jersey. The margin of profit, it is true, is materially reduced when compared with last season's figures, but if the reduction in the price shall have opened new avenues of use for the Lake ores which are already brought in competition with Southern ores, the result will be accepted by the interested parties without grumbling. The sales of 10,000 tons of a high grade non-Bessemer ore is reported at $4.40, and the price of standard hard ores is not as firm as it has been quoted in the earlier part of the season. An ore which, last year, sold for $7, and which was started this year at $6, is now being held at $5.50, and another kind of a high grade standard ore that started out at $5.75 this season, may now be bought at $5.25, and lower. The signs of the times point to smaller margins all around, and the ore business is no exception. There is no foundation in the rumors of higher lake freights. On the contrary, coal freights are weakening and, as the supply for western shipment is showing a marked falling off, there is no reason for expecting an advance in ore freights. Coke continues to be sold at almost cost, but furnacemen are unable to obtain contracts based on current prices.

Pig Iron.

When it is stated that large quantities of iron are changing hands at what, a year ago, seemed ruinous prices, the situation is as fully described as may be. But the furnacemen, in common with others in the iron business, have adapted themselves to a situation which they could not alter, and as a result, one firm that has plenty of capital, along with confidence in the future of the iron business, has bought 2,000 tons of No. 1 foundry iron, to be delivered at any time within three months, for spot cash, at an average price of $15.45 at the furnace. Of this quantity, one lot of 500 tons went at $15.25. This, of course, is the spot cash price at a Valley furnace especially favored in the way of location as to shipping facilities. The demand of iron is more than good. Bessemer grades are practically out of the market, the furnaces being sold up at fair prices. Foundry irons are also freely bought, and the past week has seen some very heavy sales of charcoal iron, to the makers of malleable iron. The manufacturers of agricultural implements are buyers at this time, and they are placing orders for round lots, to be delivered by October and November. There seems to be a falling off in the sale of mill iron, induced by the lack of consumption by the mills, but the furnacemen are not willing to give their iron away, and an offer, by a syndicate, for 10,000 tons at $13.25 has been refused. We quote, f. o. b. cars, Cleveland, four months:

CHARCOAL PIG IRON.

Lake Superior Charcoal all numbers	22 00@24 50

BITUMINOUS AND COKE IRON.

No. 1 Bessemer	$18 35@18 85
No. 1 foundry, all lake ores	17 85@18 35
No. 2 same	16 85@17 35
No. 1 foundry, lake ores, with cinder mixture	17 35@17 85
No. 2 same	16 35@16 85
No. 1 silvery, native Ohio ores	17 50@18 50
No. 2 same	16 50@17 50
No. 1 gray forge, red short	16 35@17 35
No. 1 gray forge, neutral	15 35@16 35
No. 1 American Scotch (Black Band)	18 85@19 35
No. 2 American Scotch "	17 85@18 35

Manufactured Iron.

The expected advance in the price of bar iron has failed to materialize and, so far from obtaining the $35 at which bar iron has been "officially" quoted, holders are willing enough to part with it now at the best prices they can get, which is $1.70 in some cases and $1.65 in others. The opinion is gaining ground that the mill strike will not affect the market and that it will not even be felt. Under the circumstances, an attempt to drive up the price of bar iron would be as short-lived as it would prove useless, and so the old prices rule. Sales are improving, however, the past week being productive of considerable business. One sale of 300 tons is reported, with a negotiation for 1,000 tons pending. Sheet iron is keeping up its end, at full quotations. The sheet mills will soon start up again and they will find all the work they can turn out.

Scrap Iron.

Little is doing in this market. Old American rails are being freely offered at $19.95, without takers. There is no sale for miscellaneous scrap.

Hardware.

Despite the advanced season, business is still very good with the jobbers, in all the branches. Metals are recovering and cut nails, which were quite weak some weeks since, are selling a little stronger.

LOUISVILLE PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Geo. H. Hull & Co.

There has been very little business during the last week transacted for immediate shipments, though many sales for several hundred tons of Bright and No. 2 foundry have been made for future deliveries, there is still some little disposition to make purchases that will run through the year, but only bottom prices can be obtained for these. It is feared that in some cases, the desire to make sales will cause iron to be offered too low. If, however, prices are not cut, there is no reason why present figures should not be realized and a slight advance take place. Foundry grades are very much in demand at present, as well as mill irons, and the furnaces are not able to fill all orders for these. Bright irons however are plentiful. The rolling mills in this vicinity have signed the scale and will resume operations at once. We quote for cash, as below (July 16):

PIG IRON.—Southern Coke, No. 1, Foundry, $16 00@$17 00; Southern Coke, No. 2, Foundry, $15 00@$16 00; Southern Coke, No. 2½, Foundry, $14 00@$15 00; Hanging Rock Coke, No. 1, Foundry, $16 50@$17 00; Hanging Rock Charcoal, No. 1, Foundry, $20 25@$22 25; Southern Charcoal, No. 1, Foundry, $17 25@17 75; Silver Grey, different grades, $13 25@$14 25; Southern Coke, No. 1, Mill Neutral, $12 75@$13 75; Southern Coke, No. 2, Mill, Neutral, $12 25@$13 25; Southern Coke, No. 1, Mill, Cold Short, $12 25@$13 25; Southern Charcoal, No. 1, Mill, $13 25@$14 75; White and Mottled, different grades, $12 00@$12 50; Southern Car Wheel, Standard Brands, $21 50@$24 50; Southern Car Wheel, other brands, $18 50@$20 50; Hanging Rock, Cold Blast, $22 50@$24 50; Hanging Rock, Warm Blast, $18 50@$19 50.

CINCINNATI PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co.

The market has been hesitating the past week, and, on the whole, quiet. Nevertheless, quite a fair business has been transacted. There is a growing conviction among furnacemen that a healthy reaction in prices is not very far ahead. Acting on this belief, some companies refuse to make contracts through the remainder of the year at lowest current prices. The Tennessee Coal, Iron & Railroad Company, which now usually makes prices for Southern iron, will book no orders for delivery beyond 60 days. So far, however, no case has developed where buyers have been unable to cover wants for four months ahead at market prices, the assurance of large crops gives a healthy undertone. We quote for cash (July 14):

HOT BLAST FOUNDRY.—Ohio and Southern Coke, No. 1, $16 50@$17 00; Ohio and Southern Coke, No. 2, $15 50@$16 00; Ohio and Southern Coke, No. 2½, $14 50@$15 00; Ohio Soft Stonecoal, No. 1, $17 00@$17 50; Ohio Soft Stonecoal No. 2, $15 00@$15 50; Mahoning and Shenango Valley No. 1, $16 50@$17 00. CHARCOAL IRON.—Hanging Rock Charcoal No. 1, $20 50@$22 50; Hanging Rock Charcoal No. 2, $19 00@$21 00; Tennessee and Alabama Charcoal No. 1, $17 00@$18 00; Tennessee and Alabama Charcoal No. 2, $16 00@$17 50. FORGE—Strong Neutral Coke, $13 50@$14 00; Mottled Neutral Coke, $12 50@$13 00; Cold Short Coke, $13 00@$13 50. CAR WHEEL AND MALLEABLE—Southern Car Wheel, $20 00@23 00; Hanging Rock Cold Blast, $22 00@$25 00; Lake Superior Malleable, $21 00@$22 00.

ST. LOUIS PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co.

Southern irons are apparently firmer in this market, offers being refused on standard irons that would have been accepted a few weeks ago. Still there is no nominal advance in prices. Missouri charcoal irons are again going into the general market, with prices below Southern charcoal and coke irons. The stove foundries are now idle, and general foundry business is only moderately active. The large buyers have made quite extensive contracts, but have not covered their wants for the rest of the year. We quote cash, f. o. b., St. Louis (July 14):

Charcoal Foundry—Missouri No. 1, $16 25@16 75; Southern No. 1, $17 00@$18 00; Southern No. 2, $16 50@$17 00. Coal and Coke Irons.—Southern No. 2, $16 00@$16 50; Ohio Softeners, $17 00@21 00. Mill Irons—Missouri, $14 75@15 25. Southern No. 1, $14 50@14 75; Southern No. 2, $13 50@$14 00; Car Wheel & Malleable Irons—Southern, $20 00@25 00; Lake Superior, $21 00@22 00; Connellsville Coke, East St. Louis, $4 35; Connellsville Coke, St. Louis, $4 50.

CHICAGO PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Rogers, Brown & Co., W. W. Backman, Resident Agent.

The market is undeniably dull. There are inquiries enough to make a large business, if they resulted in sales. Buyers, however, cannot quite think that the end of the long decline has come, and hesitate to go into larger orders. One after another of brands, that have figured considerably in this market, are dropping out of the race. Still there is no scarcity of any grade of iron, and the pressure to sell makes consumers feel masters of the situation. Railroad building, to the surprise of all, is running very nearly as heavy as last year, and there is a fair amount of new construction going on in bridge, house, cable and other lines that lie at the basis of the iron market. Southern prices are generally held firm. Lake Superior charcoal hesitates. We quote (July 14):

Coke and Bituminous Coal Foundry:—Ohio Hanging Rock softeners, No 1, $18 00@18 50; Ohio Black Band No. 1, $18 00@18 50; Ohio Jackson county, No. 1, $18 00@18 50; Lake Ore and Cinder No. 1, $17 00@17 50; Southern coke foundry No. 2, $17 00@17 50; Southern coke foundry No. 2½, $16 50@17 00; Southern coke foundry No. 3, $16 00@16 50. Charcoal Foundry:—Lake Superior, $19 50@20 50; Southern, $19 00@20 00; Hanging Rock, $20 50@22 50. Car Wheel and Malleable:—Lake Superior, $19 50@20 50; Standard Southern, $21 00@24 00; Hanging Rock Cold Blast, $24 00@26 00; Hanging Rock Warm Blast, $22 00@24 00.

DETROIT PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by William F. Jarvis & Co.

There has been no material change in the pig iron market here during the past week, except that a firmer feeling seems to exist among the Lake Superior charcoal men. A number of large orders have been placed, in some cases for a year's supply, at prices that have ruled for the past three or four weeks, and from the number of inquiries received and the amount required, it would seem as if the near future would show a considerable increase both in the number of sales and tonnage, for this grade of metal. Ohio and Southern irons have been quite active, although not as steady as charcoal iron. We quote the market to-day as follows (July 16):

Lake Superior Charcoal, all numbers, $20 00@$21 50; Lake Superior Coke, all ore, $19 00@$19 50; Lake Superior coke, cinder mixed $18 00@$18 50; Standard Ohio Blackband, $19 00@$19 50; Southern No. 2, $17 75@$18 25; Southern Silvery, $17 00@$17 50; Southern Gray Forge, $15 50@$16 00; Jackson County (Ohio) Silvery, $18 50@19 00; Old Wheels, $19 00@$20 00.

A Proposed "Three Americas" Exhibition in 1892.

The chairman of the House Committee on Foreign Affairs in Congress has been authorized to report a bill providing for a permanent exposition of the Three Americas, in honor of the 400th anniversary of the discovery of America, under the joint auspices of the forty-six States and Territories and the sixteen independent nations of the American continent.

The bill provides that space for the exposition be assigned, under the direction of the President, in some unoccupied governmental reservation in Washington, as follows: 1. Space for a permanent State and Territorial building for a permanent exhibit of the representative history, resources, arts and industries of the forty-six States and Territories of the United States, to be available whenever the States and Territories, or a majority thereof, shall make the necessary appropriations for the expenses of building and exhibit. 2. Space for a permanent Three Americas building for a similar permanent exhibit of the fifteen Spanish-American republics, the empire of Brazil, the dominion of Canada, and the various colonies of North, Central and South America, the space to be available whenever such nations and colonies, or a majority thereof, shall make the necessary appropriations for the expenses of building and exhibit. 3. A suitable site for a statue of Christopher Columbus, to be available whenever the necessary funds are provided for the expenses of the proposed statue.

A Superior Southern Iron.

Messrs. Chamberlain, Wheeler & Co., Columbus, O., inform us that they have been appointed sole sales agents for the Sheffield & Birmingham Coal, Iron & Railway Co. This company's plant, which is one of the largest in the South, has just been completed and stack "A" will be blown in at once. Stacks "B" and "C" will be lighted within the next few weeks. The aggregate daily capacity of these furnaces is 420 gross tons. They will use entirely the famous brown hematite ores, and consequently their product in quality will be unsurpassed by any irons made in the South. The members of the above firm—Messrs. Lee Chamberlain, J. F. Wheeler and H. D. Turney—are well and favorably known to the iron trade.

LIST OF PATENTS.

Relating to Iron, Steel, Metal, Machinery, Hardware and Mining Interests.

Reported expressly for this paper by H. T. Fisher. (late Ex. U. S. Patent Office), Patent Attorney, 34 Blackstone Building, Cleveland, O.

BEARING DATE JULY 3, 1888.

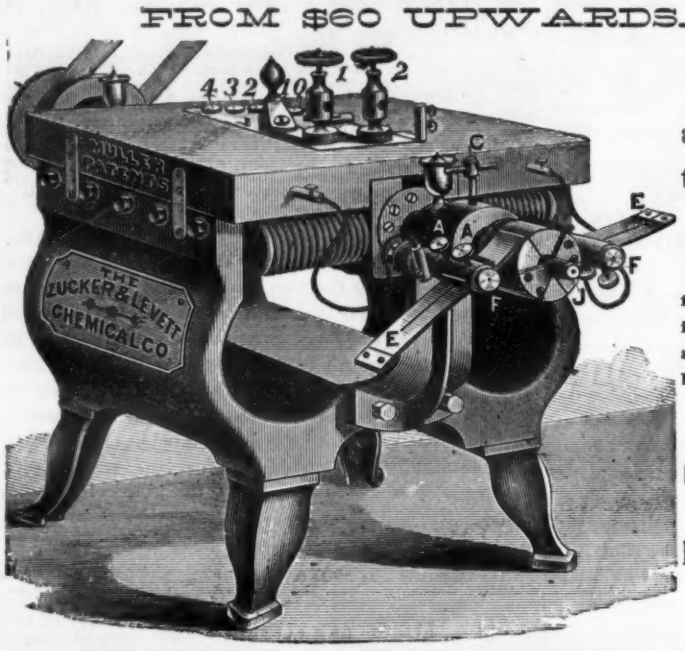
Lathing, machine for making metallic, A. Ekstrom, Detroit Mich.
Lathing, machine for slitting metallic sheets for metallic, J. R. Brandon, Detroit, Mich.
Metal-galvanising apparatus, R. Grey, Struthers, O.
Metal-hardening device, J. G. Folsom, Winchendom, Mass.
Miner's car checks or labels, fastening for, H. Corrigan, Forest City, Pa.
Nails, making cut, R. H. Plass, New York, N. Y.
Ores and other materials, machine for reducing, G. Conkling, Gurdon, Glens Falls, N. Y.
Ore-concentrating apparatus, G. F. Gould, Grass Valley, Cal.
Smelting furnace, O. B. Peck, Chicago, Ill.
Welding machine, direct electric, E. Thompson, Boston, Mass.

$60 | AMERICAN GIANT DYNAMO. | $60

Electro-Plating and Electrotyping Machines

IN ALL SIZES,

FROM $60 UPWARDS.



Cheapest and Best in the Market.

Headquarters for everything in the Plating and Polishing line.

NICKEL PLATING AND Polishing Materials.

ZUCKER & LEVETT CHEMICAL CO.,

ESTABLISHED 1863, INCORPORATED 1881.

SOLE MANUFACTURERS & PATENTEES,

Works: 538 to 564 W. Sixteenth St. Office: 36 to 40 Eleventh Ave., New York, U. S. A.

Cleveland Foundry

Castings

For Machinery and Rolling Mills

Car Wheels

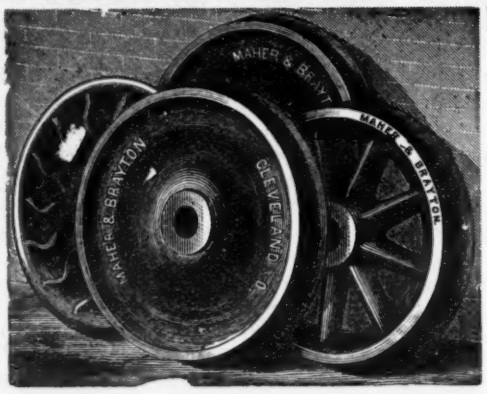
all sizes and kinds, with and without Axles.

Chilled Faced R. R. Frogs

STREET RAILROAD TURNOUT.

Nos 9, 11 & 13 Winter Street. } Bowler & Co

CLEVELAND WHEEL & FOUNDRY WORKS.



MAHER & BRAYTON, Proprietors,

Manufacturers of

Car, Engine, Truck and Tender Wheels.

RAILROAD, ROLLING MILL and Machinery Castings.

and Street Railroad Wheels and Turnouts.

ALSO

Chilled-Faced Railroad Frogs.

Office: 20 Carter Street,

Works: Cor. Carter and Collins Streets.

Cleveland, Ohio. 32

EMERY WHEEL

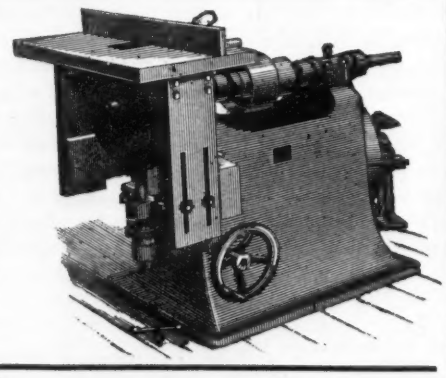
Surfacing Machine.

Base of machine has sufficient flare to give solid floor foundation.

Table is so supported that it cannot spring under heavy weights. Solid emery wheels or wood covered wheels can be used, and table is easily adjusted to wearing away of wheel. Machine is well proportioned and thoroughly built. Write for circular.

Springfield Glue & Emery Wheel Co.

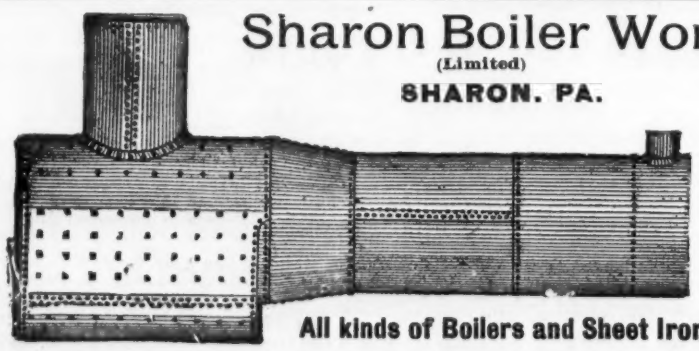
SPRINGFIELD, MASS.



Sharon Boiler Works,

(Limited)

SHARON, PA.

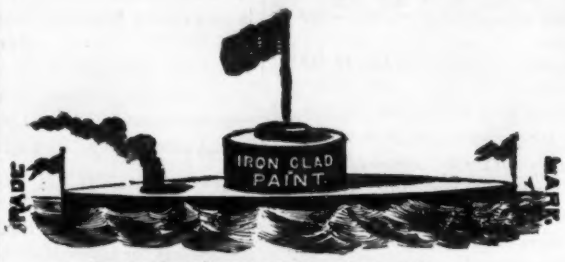


All kinds of Boilers and Sheet Iron work.

Iron Clad Paint Co.

Factory 75 & 77 Central Way. Sec & Treas. No. 3 Case Building.

CLEVELAND, OHIO.



Trade Mark Patented—Paint Patented

Order direct from the Iron Clad Paint Co.,

And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green and now owned by this Company.

IRON CLAD PAINT is the most durable, most fireproof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil.

Used by Nearly all the Railroads. 63

STAR OIL BURNER

EXCELS ALL OTHERS.

Economy in the use of Oil as a fuel. No Clogging, Leaking or Dripping. No Smoke, Ashes or Labor. Cheaper than Coal. Protection to Boilers. Specially adapted to Boiler Furnaces, Brick and Lime Kilns, Glass Melting and Distilleries, and any place where coal is used.

Send for Circular.

THE STAR OIL BURNER CO.,

CLEVELAND - - OHIO.

O'DONNELL & BARRETT,

BUILDERS OF

Hydraulic and Steam Passenger and Freight

ELEVATORS.

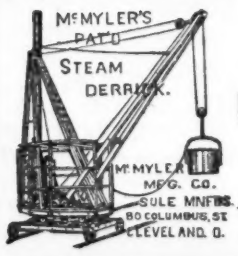
Also Hand Elevators and Dumb Waiters.

No. 53 Center Street,

Telephone No. 2111. CLEVELAND, O

All Kinds of Elevators Repaired.

McMYLER MANUFACTURING CO.,



180 Columbus St., Cleveland, O.

SOLE MANUFACTURERS OF THE

McMYLER PATENT

Revolving Steam Derrick,

AND THE

SEATON RIVET and BOLT HEADER.

Also General Hoisting and Conveying Machinery, Coal and Ore Buckets and Dump Cars.

811y

HERCULES POWDER

HERCULES, THE GREAT STUMP AND ROCK ANNIHILATOR.

SEND FOR DESCRIPTIVE PAMPHLET

Stump before a blast. | Fragments after a blast.

STRONGEST and SAFEST EXPLOSIVE Known to the Arts.

POWDER, FUSE, CAPS, Electric Mining Goods,

AND ALL TOOLS FOR STUMP BLASTING,

FOR SALE BY THE

HERCULES POWDER COMPANY,

40 Prospect street, Cleveland, Ohio.

J. W. WILLARD, Manager.

CLEVELAND WHOLESALE PRICES.

HARDWARE.

Anvils. per lb.
American....10cts dis 20@20&5
Wrights....10c

Anvil Vise and Drill.
Millers Falls Co. $18....dis 20
Cheney Anvil and Vise....dis 25

Augers and Bits.
Common augers and bits....dis 60&10
Snells....dis 60&5
Cook's Douglass Mfg. Co....dis 55
Russell Jennings' augers and bits....dis 25
Expansive Bits, Clark's small. $18; large, $26....25
Hollow Augers, Ives'....dis 25&10
Hollow Augers, Bonney's Adjust. ₱ doz. $48....dis 40&10
Hollow Augers, Stearns' Adjust. ₱ doz., $48....dis 20&10
Gimlet bits....per gross $4 50
Standard Bit Stock Drills....dis 50&10&10
Ship Augers....dis 15@15&10

Awl Hafts.
Sewing, brass ferrule,....₱ gross $3.50, dis 45
Patent sewing, short....₱ doz $1.00, dis 40&10
Patent sewing, long....$1.20 ₱ doz net
Patent peg, plain top....$10.00 ₱ gro., dis 45
Pat. peg, leather top....$12.00 ₱ gro., dis 45

Awls, Brad Sets, &c.
Awls, Sewing, Common....₱ gross $1.75—dis 45
Awls, Shouldered Peg ₱ gross....$3.00—dis 45
Awls, Patent Peg....₱ gross 75c—dis 45
Awls, Shouldered Brad....$3.00—dis 10
Awls handled brad....$7.80—dis 30
Awls handled, scratch....$7.50 ₱ gro dis 35&10
Awls, socket scratch....$1.50 ₱ doz dis 25
Brad Sets, No. 42, $10.50; No. 43. $12.50....dis 60
Brad Sets, Stanley's Excelsior, No. 1. $7.50....dis 30

Axes.
Makers' and Special Brands—
First quality....₱ doz. $7 00
Others....₱ doz. $5 75@$6
Full polished....$8 00

Axle Grease.
Frazier's, in bulk....keg ₱ lb 4c; pail 5c net
Frazier's, per gross....$9.50

Bag Holders.
Sprengle's pat., ₱ doz $18....dis 60

Balances.
Spring balances....dis 45
Common 24 lb....₱ doz $1.50 dis 50

Bells.
Hand, light Brass....dis 70
Hand, White Metal....dis 60
Hand, Silver Chime....dis 25&10&5
Hand, Globe (Cone's Patent)....dis 25&10@35
Gong, Abbe's....dis 25&10
Gong, Nichols....dis 40
Gong, Barton's....dis 40&10
Cow, western....Sargent's List 70
Call....dis 33⅓
Farm bells....dis 70
Steel alloy, church and school....dis 40

Bellows. Discount.
Blacksmith's.... { Hill's....40 / Bullock's....50&10
Moulders, ...discount 40
Hand, ...discount 40

Belting, Rubber.
Boston Belting Co.'s standard....dis 60&10
" " " extra....dis 50&10
" " " best....dis 45
Cleveland Rubber Co., extra standard....dis 60&10
Shultz Raw Hide Leather Belting, single, dis 30
" " " " double, dis 35
Standard, oak tanned....dis 50
Alexander Brothers' Pure Oak Tanned—
New list Oct. 1st, 1887, less....35

Bench Stops.
Hotchkiss's ₱ doz $5.00....dis 10
Weston's ₱ doz No. 1, $10.00; No. 2, $9 dis 25&10&5
Morrill's ₱ doz $7.50 dis 25

Bit Holders.
Extension, Barber's....₱ doz $15 00, dis 25
Diagonal....₱ doz $24.00 dis 40
Angular....₱ doz $24 00, dis 40

Blind Staples.
Barbed ⅛ inch and larger....₱ lb 8@8½c net
Barbed ⅝ inch....₱ lb 9@9½c net

Bolts.
Cast iron barrel bolts.... 70
Cast Iron shutter bolts, etc.... 70
Cast iron chain bolts....65
Ives patent door bolts.... 55
Wr't iron barrel bolts.... 70
Wrought iron square bolts.... 70
Wrought shutter bolts.... 60
Sargent's list
Carriage com. new list....75&5
Tire, common, new list....65&10
Carriage and tire, Philadelphia pattern....75&10
Stove bolts....60
Plow bolts....50
Machine....70
Ends....dis 70

Blind Fasteners.
Van Sand's Screw Pattern $15 ₱ gross—dis 60&10
Van Sand's Old Pattern....$15 ₱ gross—dis 50&10
Automatic for wood....$10.50 } 20
" " brick....$13.50 }

Borax.
₱ lb....9c

Boring Machines.

Without augers.	Upright	Angular
Snell's. Rice's patent	5 50	6 75 dis 40&10
Lawrence	5 50	6 75 dis 45@45&10
Other machines	2 35	2 75 net
Phillips, with augers	6 00	7 00 35

Braces.
Barber's....discount 50
Spofford's Patent....discount 50@50&10
Bartholomew's Nos. 25, 27, 30....dis 50&10
Bartholomew's Nos. 117. 118, 119....dis 70
Amidon's corner brace....dis 40@40&10
Pecks....dis 60

Brackets.
Shelf, plain, Sargent's list....55&10
Sancy " " "....dis 60&10
Reading, plain....dis 55&10
Reading, rosette....dis 60&10

Bright Wire Goods.
Regular List....75&10@80&10

Broilers.—Henis' self basting.
Inch.... 9 10 9x11
Per doz....$4 50 5 50 6 50

Buckets, Galvanized.
Iron clad 10 qt $2 75; 12 qt $3 00; 14 qt $3 75

Bull Rings.
Humason, Beckley & Co.'s....dis 70&10
Peck, Stow & W. Co.'s....dis 50&10
Ellrich Hardware Co., white metal low list dis 50 @50&10

Butts. Discount
Wrought brass....70&10
Cast brass, loose joint....33⅓&10to33⅓&10&10
Cast Iron—
Fast joint, narrow....50&10&5
Fast joint, broad....55&10&5
Loose joint....66⅔&10
Loose joint, jap....66⅔&10
Loose joint, jap. with acorns....66⅔&10
Loose pin, acorns....66⅔&10
Loose pin. japanned acorns....66⅔&10
Loose pin. acorns. japanned, plated tips....66⅔&10
Wrought steel—
Wrought, fast joint narrow.... 65&10
Wrought, fast joint broad.... 65&10
Wro't loose joint broad.... 65&10
Table Butts. back flaps, etc.... 65&10
Regular inside blind.... 65&10
Light inside blind.... 65&10
Loose pin.... 65&10
Light loose pin.... 65&10
} 70 @

Can Openers.
Sprague No. 1 $2.00. 2 $2.25, 3 $2.50,....dis 50&10
Star....$4 00 net
Domestic....₱ doz $2 50, dis 45
National....$1 25, dis 45

Caps—Percussion, ₱ 1000.
Hicks & Goldmark's
F. L. Waterproof, 1-10's....50c
E. B. Trimmed Edge, 1-10's....65c
E. B. Ground Edge, Cent. Fire, 1-10's 70c
Double Waterproof, 1-10's....1.40
Musket Waterproof, 1-10's....54c
G. D....30
Elys waterproof central-fire....$1.60
Elys E. B....56c
} dis. 25

Cartridges.
Rim fire....discount 50&5
Pistol and rifle....discount 25&5
Military and sporting....discount 15&5

Carpet Stretchers.
Cast steel, polished....₱ doz $3.25
Cast iron, steel points....per doz 80c
Socket....₱ doz $1 75
Bullard's....dis 25

Cattle Leaders.
Humason, Beckley & Co.'s....dis 70
Sargent's....dis 66⅔&10
Peck, Stow & W. Co....dis 50&10

Carpet Sweepers.
Queen....₱ doz $16.00
Mystic....₱ doz $16
Cottage....₱ doz $15
Queen, with band....₱ doz $18
King....₱ doz $30
Garland....₱ doz $18

Cards.
Horse and Curry....dis 10

Casters.
Bed....
Plate....
Shallow Socket....
} dis 50&10@60&5
Deep Socket....dis 40&10
Yale Casters, list May, 1884....dis 30 &10@40
Martin's patent....dis 45&10

Chains.
Trace, 6½-10-2....₱ pair 1.03
Trace, 6½-10-3....₱ pair 92c
Trace, 7-10-2....₱ pair 1.11
} dis 50&5@50&10
German Halter Chain, list June, 1884....dis 55
German Coil, list of June, 1881....dis 55
Galvanized Pump Chain....₱ lb 6½
Jack Chain, Iron....70&10
Jack Chain, Brass....dis 70&10

Chalk.
White....₱ gross 55c
White Crayon....₱ gross 12@12½
Red....75c
Blue....85c

Chisels.
Socket Framing, and Firmer....dis 75@ 75& 5
Socket Framing and Firmer, Buck, Bros....dis 25
Socket Firmer & Framing, L. & I. J. White....dis 30@30 & 5
Tanged Firmers....dis 40

Clamps.
Snow's adjustable, iron....dis 40
Hammer's adjustable, iron....dis 15
Sargent's cabinet, iron....dis 66⅔&10

Clips.
Axle and spring bar, Norway iron....dis 55&5&5
Wrought-Iron felloe clips....₱ lb. 5½c
Steel felloe clips....₱ lb 5c

Cockeyes.
discount....50

Cocks, Brass.
Hardware list....dis 40

Coffee Mills.
Enterprise....20 & 10@30

Compasses, Dividers, &c.
Compasses....dis 70@70&10
Calipers....dis 70@70&10
Dividers....dis 70@70&10
Bemis & Call Co.'s Dividers....dis 50&10
Bemis & Call Co.'s Compasses & Calipers..dis 45&5
Bemis & Call Co.'s Wing & Inside or Outside....dis 45&5
Bemis & Call Co.'s Double....dis 50&10
Bemis & Call Co.'s (Call's Patent Inside) dis 25&5
Excelsior....dis 50
Cook's Extension....dis 25
J. Stevens & Co.'s Calipers and Dividers....dis 25&5

Coopers' Tools.
Bradley's....discount 20
Barton's....discount 20
L. & I. J. White....20 & 5

Corkscrews.
Humason, Beckley Mfg. Co....dis 40
Clough's patent....dis 33⅓

Corn Knives.
Clipper....2.00
X. L. C. R....4.50
Russetts....6.50

Cradles.
Grain....dis 40&10@50

Crowbars.
Cast steel....₱ lb 4
Iron, steel points.... 3½

Curry Combs.
Fitch's Pattern....dis 40
Rubber....₱ doz. $10.00, dis 25

Cutlery.
Table....net
Excelsior Pocket....net

Dog Collars.
Embossed gilt....dis 30&10
Leather....dis 40

Door Springs.
Torrey's Rod, regular size....₱ doz $1.30
Gem (Coil); list April 19, 1886,....dis 10

Drawing Knives.
Douglass & Middletown....dis 75@75&10
L. & I. J. White....dis 20 & 5
Adjustable handle....dis 20

Drills and Drill Stocks.
Blacksmiths' each....2.00
Blacksmiths' self-feeding, each...$7.50 discount 20
Breast, P. S. & W....discount 40 & 10
Breast, Millers Falls....each, $3.00 dis 25
Ratchet, Weston's....20@25
Automatic Boring Tools....each, $1.85
Twist drills....50&10
Morse....50&10
Syracuse....50&10
Standard....50&10
Cleveland....50&10

Drill Chucks.
Morse's Beach Patent....each, $8.00, discount 15
Standard....dis. 25

Dripping Pans.
Sheet Iron....large sizes 7c
Shheet Iron....small sizes 6½c

Egg Beaters.
Dover....per doz. $2.00
Standard....per gross $12.00

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour. CF F. FF.
Kegs, ₱ lb	4 c	4¼c	2¾c
½ kegs, ₱ lb	4¼c	4¾c	3 c
¼ kegs, ₱ lb	4½c	5 c	3¼c
10 lb cans, 10 in case	6 c	6 c	5 c
10 lb cans, less than 10	10 c	10 c	7½c

Escutch a Pins.
Iron, List Nov. 11, 1885....dis 50&10@50&10&5
Brass....65@65&5

Escutcheons.
Door Lock....Same discounts as Door Locks
Brass Thread....dis 60
Wood....dis 25

Files.
Rothery....40
Nicholson....50&15
Black Diamond....60&10
Royal....75
Heller's horse shoe rasp....dis 50&10

Faucets.
Frary's Patent Petroleum....dis 40 &5
First Quality, Cork Lined....40&10
Self-measuring, Enterprise, per doz $36 dis 20&10

Fly Traps.
Paragon....₱ doz $1.75

Forks
Hay, Manure and Spading, list....dis 65&5

Fruit and Jelly Presses.
Enterprise Mfg. Co....dis 20&10

Fry Pans
Central Stamping Co.'s list....dis 70

No	0	1	2	3	4	5	6	7	8
₱ doz	$3 00	3 75	4 25	4 75	5 25	6 00	7 00	8 00	9 00

Fluting Scissors.
Discount....45

Fluting Machines
Eagle 3¼ inch....$2.15, dis 35
Geneva Hand Fluter, White Metal.. ₱ doz. 12.00....dis 25
Shepard hand. Nos. 85 $15.30. 95 $8. 110 $11 dis 40
Knox, 4½ inch rolls....$3 25 each } dis 35
Knox, 6 inch rolls....$3 60 each }
Crown, 4½ in. $3 50; 6-in. $4 00; 8-in. $6 50 each....dis 35
Crown Jewel....6-in. $3 50 each, dis 35
American. 5-in. $3; 6-in. $3 40; 7-in. $4 50 each....dis 35
Crown hand fluter, Nos. 1 $15; 2, $12 50; 3, $10 ₱ doz....dis 30

Gauges.
Marking....dis 60&10
Wire....dis 10&10

Gimlets.
Nail and Spike....dis 50&10
Double Cut, low list....25
"Bee"....₱ gross $12. dis 25

Glue Pots.
Tin enamele d....dis 40@
Family, Handy....dis 45

Grindstone Fixtures.
Sargent's....dis 70

Gun Wads.
U. M. C. & W. R. A.—B. E., 11up...2 00
U. M. C. & W. R. A.—B. E., 9&10...2 30
U. M. C. & W. R. A.—B. E., 7&8....2 60
U. M. C. & W. R. A.—P. E., 11up...3 10
U. M. C. & W. R. A.—P. E., 9&10...4 00
U. M. C. & W. R. A.—P. E., 7&8....4 90
} dis 20&2
Eley's B. E., 11 up....2 00
Eley's P. E., 11@20....2 80

Hack Saws.
Griffin's Hack Saws, complete....dis 40
Griffin's Hack Saw, Blades only....dis 40
Diamond Hack Saws and Blades....dis 25

Halters.
Jute horse and cattle ties....$13.50 gro. net.

Hammers.
Maydole's....discount 25@25&10
Atha new list, Jan 15, 1887....dis 40&10@50
Magnetic Tack, No. 1, 2, 3, $1.25, $1.50 and $1.75, dis 30
Heavy hammers and sledges under 5 lbs, 36c, over 5 lbs, 30 c....dis 70

Hand Cuffs and Leg Irons.
Providence Tool Co., hand cuffs, $15 ₱ doz....dis 10
Providence Tool Co., leg irons $25 ₱ doz....dis 10
Tower's....dis 15

Handles—
Door or Thumb Latches.

Per doz	Nos. 0	1	2	3	4	
Sargent's	.90	1 00	1 18	1 35	1 50	dis 60&10
Roggin's Latches						₱ doz. 30@35c
Bronze Iron Drop Latches						₱ doz. 70c net

Jap'd store door handles—Nuts. $1 62; Plate $1 10; no plate $0 88....net
Barn door....₱ doz $1 80, dis 25
Wrought chest....dis 50&10&10
Surface chest....dis 70
Flush chest....dis 70
Lifting....dis 70
Saw and plane....dis 40&10
Hammer and hatchet....dis 25&5&2
Brad awl....₱ gross $2
Hickory firmer chisel, assort....₱ gross $4 50
Hickory firmer chisel, large....₱ gross $5 00
Apple firmer chisel, assorted....₱ gros $5 00
Apple firmer chisel, large....₱ gross $6 00
Socket firmer chisel, assorted....₱ gross $3 00
Socket framing chisel, assort....₱ gross $5 00
} dis 40
File, assorted....₱ gross $2 75
Auger, assorted....₱ gross $5 00
Auger, large....₱ gross $7 00
} 25

Hangers.
Barn Door old patterns....dis 60&10 &10
Climax (Anti-Friction)....dis 55
Star....dis 40
Scranton....dis 25
Kidder's....dis 50&10
Terry's Patent. 5 in., 12.00; 3½ in., 10.00, dis 50 @
Paragon....dis 40
Richards....dis 20&10&10

Harness Snaps
German, new list....dis 40&10
Covert, New Patent, new list....dis 50&5&2

Hay Knives.
Lightning....per doz. $18 dis 25
Electric....₱ doz $17.00 dis 30

Hinges.
Wrought Strap and T Hinges....65&10&2@70&10
Screw, hook and strap, 8 10 12 in....3½@4
" " to 36 in....2¾@3
Screw hook & eye hinges....½ ₱ doz 1.50
⅝ 2.45
¾ 3.80
} ....dis 10
Gate, western....₱ doz $4 40, dis 55
Gate, N. E....₱ doz $7 00, dis 55
Gate, N. E. reversible....₱ doz $5 20, dis 55&15
Gate, Clark's, Nos. 1. 2. 3....dis 60&10@60&10&10
Gate, N. Y. State....₱ doz $5 00, dis 55&15
Gate, automatic....₱ doz $12 50, dis 50
Gate, common sense....₱ doz pair $4 50, dis 50
Gate, Shepard's....dis 60&1

Hollow-Ware.
Stove Hollow-Ware, Ground dis....60&10&10
" " Undground....70&10
Enameled Kettles....dis 70
Saucepans....dis 40
Galvanized Tea-Kettles

Inch	6	7	8	9
Each	55	60	65	75

Hoes.
Garden, mortar....dis 65&5
Planter's, cot....dis 65&5
Canton....dis 65&5

Hog Rings and Ringers.
Hill's rings....$2 50
" ringers.... { Old Style....$2 50 / Improved....$3 60
Blair hog ringers....₱ doz $2.50

Hooks.
Bird Cage, Sargent's list....dis 60&10&10
Belt....dis 75&10
Clothes Line Sargent's list....dis 60&10
Ceiling Sargent's list....dis 55&10
Coat and Hat, Sargent's list....dis 55&10
Wire Coat and Hat, Gem....dis 45
Wrought Staples and Hooks & Staples, list Jan 12, 1887....dis 80&20
Wire Screw Hooks and Screw Eyes....dis 75&10
Hooks and Eyes—Malleable Iron....dis 70
Hooks and Eyes—Brass....dis 60&10&10

Horse Nails.

No.	10	9	8	7	6	
Ausable. ₱ lb	23	24	25	26	28	dis 25&10 to 25&10&10
Putnam, ₱ lb	19	20	21	22	24	dis 15

Essex....33⅓&5
Capewell....33⅓

Burden....₱ keg $4.25
R. I. Horse Shoe Co., Perkins' Imp. at factory....₱ keg $4 25
Mule Shoes, at factory....₱ keg $5.25

Hose, Rubber, Boston Belting Co's.
Standard....70
Extra....50&10
Best....45&10

Ice Picks, Chisels, &c.
Am. Ice Chisel Pol'd....₱ doz. $3.00, dis 20

Ice Cream Freezers.
American....50&10
Gem....55&10
Crown....50&10

Ice Tongs.
Champion....₱ doz $4.00, dis 25&10
Family....₱ doz $2.75, dis 20@25

Jack Screws.
Illinois Bolt Co. list....dis 70

Kettles.
Brass, 7 to 17 inches inclusive....₱ lb 22c. net.
Brass larger than 17 inches....₱ lb 24c.
Enameled and Tea Kettles....See Hollow Ware

Keys.
Eagle, cabinet, trunk and padlock....dis 33⅓ and

Knives.
Russell's Butcher....net
Moran's Shoe Knives....dis 20

Knobs.
Carriage, Japanned....₱ gross 80c. dis 60&10
Base, Rubber Tip....dis 70&10&5
Hemacite Door Knobs, new list....dis 40@40&10
Door Mineral....75c
Door Por. Jap'd....90c
Door Por. Por....3 00@3 25
Door Por. Plated....2 90@3 00

Ladles.
Melting, Sargent's....dis 55&10
Melting, Monroe's Patent, ₱ doz $4.00, dis 25&10
Melting, P. S. & W....dis 25&10

Lanterns
Tubular No. 0....$5.00 per doz
" " 1.... 7.00
Tubular, Lift Wire, No. 0, ₱ doz.... 6.50
Tubular, Lift Wire, No. 1, ₱ doz.... 7.50
Police, Small, $6.00; Med., $7.25; Large, $9.75....dis 20@2

For Sale.

A 6"x10" SELF-INKING Foot Power Printing Press; will do good work. Address J. M., care Iron Trade Review, Cleveland, O. tf

For Sale.

ONE OF DUNN'S HOISTING MACHINES, with over 40 feet of chain. Good as new; capacity, 600 lbs. Address Dunn, care Iron Trade Review, Cleveland, O. tf

Furnace for Sale.

A GOOD Charcoal Iron Furnace, in Michigan. For particulars address E. C. Pope, 31 and 22 Wilshire Building, Cleveland, O. tf

For Sale.

AN INTEREST in a profitable manufacturing establishment in Cleveland. Establishment now two months behind orders. Also a position to the right man. Address,
02-tf Box 5, care TOWN TOPICS.

For Sale.

WOODRUFF & BEACH, Hartford, Conn., Automatic Engine. 24x48: Buckeye Automatic Engine, 18x36; John Cooper & Co. Automatic Engine, 20x36; 1 Circular Mill, 68" Saw, Engine and Boiler, direct connected, $600; 2 Sturtevant Boston Blowers, large size.
CLARK CENTER.
93-9ms SANDUSKY, OHIO.

For Sale Cheap.

A NEW No. 4 INJECTOR, never been used. Address Jones, care Iron Trade Review, Cleveland, O. tf

For Sale or Exchange

FOR GOOD CITY BUILDING LOTS, a nice Nine Room House with all modern improvements, bath, gas, water and furnace, and well finished. On the best line of street cars in the city, close to Case Ave. A bargain. Address
02-tf J. E. J., care TOWN TOPICS, City.

For Sale or Exchange.

THE BRADLEY FACTORY at Ashtabula, O. has switches from two railroads, acre of buildings, large fine engines, boilers, shafting, &c.; finest shipping point on Lakes; no better point for manufacturing; at great sacrifice.
McCONNELL'S BUSINESS EXCHANGE,
93 Superior street. [09] Cleveland, O.

For Sale.

MACHINE SHOPS—Fine buildings, extensive machinery, foundry, patterns, large ground, R. R. track, clear title, a great bargain. 30,000. C. H. SMALL, Pueblo, Colorado. 541m

FOR SALE!

Coal, Timber and Grazing Land.

Fifteen Hundred to Two Thousand Acres situated in Northern Tennessee near the Cincinnati Southern R. R. Sample of Coal and analysis of same can be seen at the office of the undersigned. For full particulars address
DR. H. GEROULD,
92-3m 1191 Euclid Ave., Cleveland, O.

FOR SALE.

1 Planing Mill exhaust.
1 Spoke Lathe and Hanger with 35 feet 7-inch Belting.
1 Fey Felloe Rounder and Counter Shaft.
1 Counter Shaft and Pulley.
1 Cross-cut Saw and Table.
The above machinery is all in first-class order. For further information inquire of
51-3m G. Q. FREER, Receiver,
Alliance, O.

For Sale.

WE HAVE RECENTLY PURCHASED the Cleveland Iron Co.'s Rolling Mill plant on Carter street, and have for sale any or all the appliances belonging to the same. Favorable prices will be made to purchasers.
CLEVELAND ROLLING MILL CO.,
Room 12, Nat'l Bank B'ld'g,
Cleveland, Ohio.
Please mention this paper. 12tf

Wanted.

A GOOD BUSINESS MAN with capital, to take interest in a manufacturing iron business. 100 per cent. profit. Address J. G. J., care Iron Trade Review. tf

NOTICE TO MANUFACTURERS.

Artistic Chasing and Engraving on all kinds of metals, Designing, Die-Sinking, Stencil and Stamp Cuttings, Etc., Ornamental Models and Patterns, Working Drawings, Brass Moulds and Rolls made to order.

PH. A. SCHAEFLIN,
Room 9, Leader Building.
144 Superior St., - CLEVELAND O.

DEEP Sea Wonders exist in thousands of forms, but are surpassed by the marvels of invention. Those who are in need of profitable work that can be done while living at home, should at once send their address to Hallett & Co., Portland, Maine, and receive free, full information how either sex, of all ages, can earn from $5 to $25 per day and upwards wherever they live. You are started free. Capital not required. Some have made over $50 in a single day at this work. All succeed. wm03-1y

Engineers Don't be Deceived. The Cyclone Steam Flue Cleaner is the only Cleaner made giving steam spiral motion the entire length of the tubes.
Crescent Mfg. Co., CLEVELAND, O. 2

FINE

CATALOGUES,

Such as are desired by all Manufacturers,

—AND—

FINE

Printing

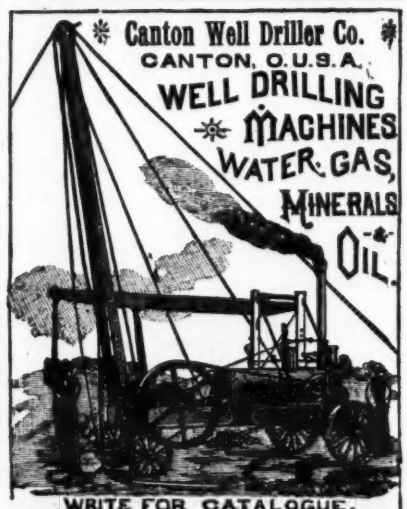
—AND—

STATIONERY.

Which every person wants, are furnished by

The Cleveland Printing and Publ'g. Co.

Lithograph Building Cleveland, O.



WRITE FOR CATALOGUE.
61-4m

JOHN ADT & SON,
NEW HAVEN, CONN.,
BUILDERS OF
Machinery for
Straightening & Cutting Wire,
—ALSO FOR—
General Hardware Manufacturing.

ENGINEERS! Don't be Humbugged.
We guarantee our A. & D. Flue Cleaners to give Steam the most perfect spiral motion entire length of tubes, and do the best work.
CLEVELAND FLUE CLEANER MF'G CO.,
821y 74 Frankfort St., Cleveland, O.

Cleveland Co-Operative Stove Company.

—MANUFACTURERS OF—

Stoves, Hollow Ware and Plumbers' Sinks.

PRINCIPAL HOUSE:

26 to 36 SUPERIOR STREET, On the Viaduct, **CLEVELAND, O.**

BRANCH HOUSES: Chicago, Ill. Indianapolis, Ind. St. Louis, Mo.
02-1m
REPOSITORIES: Des Moines, Ia. Minneapolis, Minn. Kansas City, Mo.

The Van Nostrand Science SERIES.

18mo, Green Boards. Price 50c Each.

AMPLY ILLUSTRATED WHEN THE SUBJECT DEMANDS.

No. 1—Chimneys for Furnaces, Fire-Places and Steam Boilers. By R. Armstaong, C. E., 2d Edition, with an Essay on High Chimneys; by Pinzger.
No. 2—Steam Boiler Explosions: by Zerah Colburn.
No. 3—Practical Designing of Retaining Walls; by Arthur Jacob, A. B.
No. 4—Proportions of Pins used in Bridges; by Chas Bender, C. E.
No 5—Ventilation of Buildings; by W. F. Butler Edited and Enlarged by Jas. L. Greenleaf. 2d Edtion
o. 6—On the Designing and Construction of Storage Reservoirs; Arthur Jacob, A. B.
No. 7—Surcharged and Different Forms of Retaining Walls; By Jas. S. Tate, C. E.
No. 8—A Treatise on the compound Engine; by John Turnbull, Jr. 2d Edition. With Additions by Prof. S. W. Robinson.
No. 9—Fuel; By C. William Siemens, D, C. L., to which is appended the Value of Artificial Fuels as Compared With Coal; by John Warmald, C. E.
No. 10—Compound Engines; Translated from the French of A. Mallet. With Results of American Practice, by R. H. Buel, C. E. 2d Edition.
No. 11—Theory of Arches; By Prof. W. Allan.
No. 12—A Theory of Voussoir Arches; by Prof. W. E. Cain.
No. 13—Gases Met With in Coal Mines; By J. J. Atkinson. 3d Edition. Revised. To which is added The Action of Coal Ducts. by Ed. H. Williams, Jr., E. M.
No. 14—Friction of Air in Mines; by J. J. Atkinson.
No. 15—Skew Arches; by Prof. E. W. Hyde, C. E.
No. 16—A Graphic Method for Solving Certain Algebraical Equations. by Prof. Geo. L. Vose.
No. 17—Water and Water Supply; by Prof. W. H. Corfield, M. A.
No. 18—Sewerage and Sewage Utilization; by Prof. W. H. Corfield.
No 19—Strenth of Beams Under Transverse Loads; by Prof. W. Allan.
No. 20—Bridge and Tunnel Centres; by John B. McMaster, C. E.
No. 21—Safety Valves; by Richard H. Buel, C. E.
No. 22—High Masonry Dams; by John B. McMaster.
No. 23—The Fatigue of Metals Under Repeated Strains, with various tables of results of experiments. From the German of Prof. Ludwig Spangenberg; with a preface by S. H. Shreve.
No. 24—A Practical Treatise on the Teeth of Wheels, with the theory of the use of Robinson's odontograph; by Prof. S. W. Robinson.
No. 25—Theory and calculations of Continuous Bridges; by Mansfield Merriman, C. E.
No. 26—Practical Treatise on the Properties of Continuous Bridges; by Charles Bender.
No. 27—On Boiler Incrustation and Corrosion; by F. J. Rowan.
No. 28—On Transmission of Power by Wire Ropes; by Albert W. Stahl.
No. 29—Injectors: Theory and Use; translated from the French of M. Leon Pouchet.
No. 30—Terrestrial Magnetism and the Magnetism Iron Ships; by Prof. Fairman Rogers.
No. 31—The Sanitary Condition of Dwelling Houses in Town and Country; by George E. Waring, Jr.
No. 32—Cable Making for Suspension Bridges, as exemplified in the construction of the East River Bridge; by Wilhelm Hildenbrand, C. E.
No. 33—Mechanics of Ventilation; by George W. Rafter, C. E.
No. 34—Foundations; by Prof. Jules Gaudard. C. E.; translated from the French.
No. 35—The Aneroid Barometer: its Construction and Use; compiled by Prof. G. W. Plympton; 3d edition.
No. 36—Matter and Motion; by J. Clerk Maxwell
No. 37—Geographical Surveying: its Uses, Methods and Results; by Frank De Yeaux Carpenter
No. 38—Maximum Stresses in Framed Bridges; by Prof. Wm. Cain.
No. 39—A Handbook of the Electro-Magnetic Telegraph; by A. E. Loring, a practical telegrapher; 2d edition.
No. 40—Transmission of Power by Compressed Air; by Robert Zahner, M. E.
No. 41—Strength of Materials; by William Kent.
No. 42—Voussoir Arches, applied to Stone Bridges, Tunnels, Culverts and Domes; by Prof. Wm. Cain.
No. 43—Wave and Vortex Motion; by Dr. Thomas Craig, of John Hopkins University.
No. 44—Turbine Wheels; by Prof. W. P. Trowbridge.
No. 45—Thermodynamics; by Prof. H. T. Eddy.
No. 46—Ice-making Machines; from the French of M. Le Doux.
No. 47—Linkages: the Different Forms and Uses of Articulated Links; by J. D. C. DeRoos.
No. 48—Theory of Solid and Braced Arches; by Wm. Cain, C. E.
No. 49—On the Motion of a Solid in a Fluid; by Thomas Craig, Ph D.
No. 50—Dwelling Houses; their Sanitary Construction and Arrangements; by Prof. Wm. H. Corfield.
No. 51—The Telescope, its Construction, &c.; by Thomas Nolan.
No. 52—Imaginary Quantities; translated from the French of M. Argand; by Prof. Hardy.
No. 53—Induction Coils: how made and how used 3d edition.
No. 54—Kinematics of Machinery; by Prof. Kennedy; with an introduction by Prof. Thurston.
No. 55—Sewer Gases; by A. De Varona.
No. 56—The Actual Lateral Pressure of Earthwork; by Benj. Baker, M. Inst C. E.
No. 57—Incandescent Electric Lights; by Compte Th. Du Moncel and Wm. Henry Greece ;2d edition.
No. 58—The Ventilation of Coal Mines W. Fairley, M. E., F. S. S.
No. 59—Railroad Economics; or Note with Comments; by S. W. Robinson, C. E.
No. 60—Strength of Wrought-iron Bridge Members; by S. W. Robinson, C. E.
No. 61—Potable Water, and the Different Methods of Detecting Impurities; by Chas. W. Folkard.
No. 62—The Theory of the Gas Engine; by Dugald Clerk.
No. 63—House Drainage and Sanitary Plumbing; by W. P. Gerhard; 2d edition.
No. 64—Electro-Magnets; by Th. Du Moncel.
No. 65—Rocket Logarithms to Four Places Decimals.
No. 66—Dynamo-Electric Machinery; by Silvanus P. Thompson.
No, 67—Hydraulic Tables; by P. J. Flynn, C. E
No. 68—Steam Heating; by Robert Briggs.
No. 69—Chemical Problems; by Prof. Foye; 3d edition.
No. 70—Explosive Materials; by M. P. E. Berthelot.
No. 71—Dynamic Electricity; by John Hopkinson, J. A. Schoolbred and R. E. Day.
No. 72—Topographical Surveying; by Geo. J. Specht, Prof. A. S. Hardy, John B. McMaster and H. F. Walling.
No. 73—Symbolic Algebra; or the Algebra of Algebraic Numbers; by Prof. W. Cain.
No. 74—Testing Machines; their History, Construction and Use; by Arthur V. Abbott.
No. 75—Recent Progress in Dynamo-Electric Machines; being a supplement to Dynamo-Electric Machinery. by Prof. Silvanus P. Thompson.
No. 76—Modern Reproductive Graphic Processes; by Lieut. Jas. S. Pettit, U. S. A.
No. 77—Stadia Surveying; the theory of Stadia Measurements; by Arthur Winslow.
No. 78—The Steam Engine Indicator, and its use, by W. B. Le Van.
No. 79—The Figure of the Earth; by Frank C. Roberts, C. E.
No. 80—Healthy Foundations for Houses; by Glenn Brown.
No. 81—Water Meters: Comparative Tests of Accuracy, Delivery, etc. Distinctive Features of the Worthington, Kennedy, Siemens and Hesse Metors; by Ross E. Browne.
No. 82—The Preservation of Timber, by the use of Antiseptics; by Samuel Bagster Boulton C. E.
No. 83—Mechanical Integrators; by Prof. Henry S. H. Shaw, C. E.
No. 84—Flow of Water in Open Channels, Pipes, Conduits, Sewers, etc.; with tables; by P. J. Flynn, C. E.
No. 85—The Luminiferous Æther; by Prof. D Volson Wood.
No. 86—Handbook of Mineralogy: Determination and Discription of Minerals found in the United States; by Prof. J. C. Foye.
No. 87—Treatise on the Theory of the Construction of Helicoidal Oblique Arches; by John L. Culley, C. E.
No. 88—Beams and Girders. Practical Formulas for their Resistance; by P. H. Philbrick.
No. 89—Modern Gun Cotton: Its Manufacture Properties and Analysis; by Lieut. John P. Wisser, U. S. A.
No. 90—Rotary Motion; as Applied to the Gyroscope; by Gen. J. G. Barnard.
No. 91—Leveling: Barometric, Trigonometric and Spirit; by Prof. I. O. Baker.

LATE ADDITIONS.

No. 92—Petroleum: its Production and Use; by Boverton Redwood, F. C. F.
No. 93—Notes Embodying Recen Practice the Sanitary Drainage of Buildings; with memoranda on the cost of Plumbing Work; by Wm. Paul Gerhard, C. E.
No. 94—The Treatment of Sewage; by Dr. C. Meymott Tidy.

CLEVELAND PRINTING AND PUB. CO.,
Cor. Wood and St. Clair Sts., Cleveland, O.
*** Copies sent by mail on receipt of price.

BALL & SOCKET JOINT ALLOWING FAVORABLE ADJUSTMENT TO LIGHT
STEARNS' SILENT SAW VISES.
WITH RUBBER CUSHIONED JAWS.
THE FINEST FINISHED, THE LATEST IMPROVEMENTS, MF'G BY E.C. STEARNS & CO. SYRACUSE, N.Y.
SEND FOR CIRCULAR
SOLD BY THE TRADE

Locks, Bolts, etc.

P. & F. Corbear, Locks & Bronze Goods.

Door locks, knobs and latches.....dis 60
Escutcheons and keys .....dis 60
Padlocks and padlock keys.....dis 66⅔
Bell pulls, mineral, porcelain and jet.....dis 60
Bell pulls, genuine bronze.....dis 60
Lever bell pulls, genuine bronze.....dis 60&10
Butts, genuine bronze.....dis 60&10
Butts, bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges & flaps genuine bronze....dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze .....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull genuine bronze.....dis 66⅔
Letter box plates, genuine bronze.....dis 60&10
Barn door locks .....dis 33⅓

Lemon Squeezers.

Porcelain lined.....₱ doz $6 00, dis 25&35
Wood.....₱ doz $3 00. dis 55
The "Boss" .....₱ doz $2.50
Dean's No. 1. ₱ doz $6 50: 2. $3 35;3, $1 90....dis
Little giant.....dis 50

Lines.

Cotton Chalk.....dis 40
Silver Lake, Braided, N , 0, $6.00; No. 1. $6.50; No. 2, $7.00; No. 3, $7.50 ₱ gross .....dis 25
Masons' Linen.....dis 40
Wire Clothes, No 18, $3.75; No 19, $3.25; No. 20 $2.75;.....

Mallets.

Hickory .....dis 20&10
Lignumvitæ.....dis 2(&10
Penfield Block Co., Lignumvitæ and Hickory.....dis 30

Mattocks.

Regular list..... dis 60@60&5

Meat Cutters.

Dixon's (P.S.&W.) 1 2 3 4
₱ doz. $14.00 $17.00 $19.00 $30.00 dis 4(
Draw Cut Nos. 5 2 6 8 10
Each.....$50.00 $75.00 $80.00 $225.00 400.00
dis 20@25
Woodruff's (P S & W) per doz No 100 No 150
$15 $18dis 45
Hale's—Nos. 11 12 13
$27 $33 $45 dis 70
Enterprise.....dis 30

Mincing Knives.

Am. (2d quality), ₱ gro, 1 blade, $7; 2 blades, $12; 3 blades, $18.....net
Smith's, ₱ doz. single, $4 50; double, $6 50 dis 40

Money Drawers.

Tucker's ₱ doz.....$18 @20

Molasses Gates.

Stebbins' pat .....dis 70
Stebbins' genuine .....dis 66⅔&10
Stebbins' tinned ends.....dis 40&10
Lincoin's pattern.....dis 66⅔&10
Scoville.....$7 45&10

Nails (wire).

List July 14 1887.....dis 70
Standard Penny Nails, ₱ keg card rate
{ Car lots.....$2 50
{ Less than car lots, $2 55

Nuts and Washers.

Size of bolt in.....	¼	5-16	⅜	½	⅝	¾	1
Square.....	8¼	7	5¾	4½	4	3½	3¼
Hexagon.....	15¾	11½	8¼	6	5¾	5¼	5
Washers.....	9	8	7	5	4½	4½	4¼

In lots less than 100 lbs, ₱ lb add ½c, 1lb boxes add 1c to list

Nut Crackers.

Table (Humason & Beckley Mfg. Co.).....dis 40
Blake's pattern.....₱ dos. $2 00, dis 10
Quakenbush.....$5 00 net

Oakum.

Government.....₱ lb 8 c
U. S. Navy.....₱ lb 7¼c
Navy .....₱ lb 6½c

Oilers.

Zinc and Tin.....new list dis 60&10
Brass and Copper.....new list dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₱ doz.....dis 10@ 10&10

Packing, Steam.

Boston Belting Co .....dis 60
American Packing. .....10@11c
Russia Packing.....16c
Italian Packing.....16c

Pencils.

Faber's Carpenters' .....high list, dis 50
Faber's Round Gilt.....₱ gro $5.25 net

Picks.

Railroad, 5 to 6 lbs.....$12 dis 60@60&5
... .. 6 to 7 lbs..... $13 dis 60@60&5

Pinking Irons.

₱ doz ..... 65c. net

Picture Nails.

Brass head, Sargent's list..... } dis 50&10&10
rass head, combinat'n list.....dis 50&10
Porcelain head Sargent's list, dis.....50&10&10
Porcelain head, combination list.....dis 40&10

Plane Irons.

Sandusky Tool C .....dis 25

Pliers and Nippers.

Button's Patent .....dis 40
Hall's Pat. Compound Lever Cutting Nippers, No. 2, 5 in., $13.50; No. 4. 7 in., $21 00 ₱ Doz. .....dis 20&10@33⅓
Gas Pliers. .....dis 50&10
Humason & Beckley .....dis 50
P. S. & W. Tinners' Cutting Nippers add 6 per cent. dis 10

Plumbs and Levels.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Post Hole and Tree Augers.

Samson Post Hole Digger..₱ dos. $36.00, dis 20&10
Eureka Diggers..... ₱ dos. $15.00 @ $16.00
Champion.....per doz $12.00
Vaughan's Hollow Tube Post Hole.....$24.00 dis40

Potato Parers.

White Mountain.....₱ doz $5.00@$5.50
Antrim Combination.....₱ doz $8.00
Hoosier .....₱ doz $13.50

Pruning Hooks and Shears.

Disston's Combined Pruning Hook and Saw ₱ doz $18.00.....dis 20&10
Disston's Pruning Hook....₱ doz $12.00 dis 20&10
Pruning Shears .....₱ doz 3.75@$4.00 net

Pulleys.

Hot House ..... discount 60&10
Japanned Screw..... discount 60&10
Brass Screw.....discount 60&10
Japanned Side.....discount 60&10
Japanned Clothes Line.....discount 60&10

Pumps.

Cistern, best makers.....dis 50@10&60
Pitcher spout, best makers...dis 60&10@60&10&10
Pitcher spout, cheaper goods... dis 70&5@70&10&5

Punches.

Saddlers' or Drive....₱ doz. good quality, 65@75c
Bemis & Call Co.'s Cast Steel Drive.....dis 50&5
Bemis & Call Co.'s Springfield Socket.....dis 50&5
Solid Tinners..... ₱ doz. $1.44, dis 55

Rails.

Sliding Door, Wrought Brass.....₱ lb 35c dis 20
Sliding Door, Iron, Painted... ₱ foot 6c dis 40&10

Rakes.

Cast Steel..... dis 65&5
Malleable..... dis 65&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher..... $10 @£...dis 10
Rifle Razor.....$9 50 net

Rivets.

Iron, Thousand, list November 17 .....dis 50
Iron, Ordinary, Cooper's Block and Carriage, list November 17.....dis 50
Copper .....dis 50

Rods.

Stair, Brass.....dis 25&2

Rollers.

Barn door, Sargent's list, ... dis 60&10&10
Acme (Anti-Friction).....dis 55

Rope.

Manilla. ½ inch and over.....11½c
Sisal, ½ inch and over.....11c

Rules.

Boxwood..... discount 80@80&10

Sad Iron.

From 4 to 10 lbs.....per 100 lbs 3c
Self-heating.....₱ doz $9 net
Self-Heating, Tailor's.....₱ dos $18 net
Mrs. Potts's Irons, ... dis 40&10
Enterprise Star Irons.....discount 40&10

Sash Weights.

Per ton .....$22.50@$25.00

Saws.

Disston's Circular..... discount 45
Disston's hand panel, rip &c..... discount 25
W. M. & C., Champion Regular.....per foot 24c
W. M. & C., " Thin Back.....₱ft 26c

Saw Frames.

White, Vermont.....₱ gross $12 00
Red, polished & varnished ₱ doz $1.50, ...dis 25

Saw Sets.

Aiken's Genuine.....$13.00, dis 50 &10
Morrill Saw Sets No. 1 $15.00; No. 3 and 4 $24.00 .....dis 40 &10

Scales.

Hatch, Counter, No. 171 .....₱ doz $21.00
Hatch, Tea, No. 161.....₱ doz $6.75@7.00
Chatillon's Grocers .....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882 dis 50&10

Scrapers.

Adjustable Box Scraper (S. R. & L. Co.) $6.50.....dis 30&10
Box, 1 Handle.....₱ doz $4.00, dis 10
Foot.....dis 50&10

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles dis 65&10
Stanley R. & L. Co.'s Black Handles.....dis 60&10
Sets Interchangeable.....₱ doz $18.00 dis 25

Screws.

Wood Screws—List Jan 27, 188.

Flat head iron.....	dis 70	Extra 10 to soften given
Round head iron.....	dis 65	
Flat head brass.....	dis 65	
Round head brass.....	dis 60	
Flat head bronze	65	
Round head bronze.....	60	
Machine, flat head, iron.....	dis 55	
Machine, round head, iron	50	

Bench and hand—

Bench, iron	25&10
Bench, wood, beech, per dozen $2.25.....	
Bench, wood, hickory.....	20 & 10
Hand, wood.....	20&10
Lag or coach.....	dis 66⅔@70
Coach, patent gimlet point.....	66⅔@66⅔&5
Bed.....	25&5
Hand rail, ...	66⅔&10

Saw Tools.

Atkins' patent.....₱ doz sets $6 00

Shears.

American (Cast) Iron.....dis75&10
Pruning .....See Pruning Hooks and Shears
Garnard's Lamp Trimmers.....₱ doz $4.00
Tinners'.....dis 20&2
Seymours List, Dec. 1881..... dis 60 &10&5
Seymours Tailor's Shears.....dis 33⅓

Scroll Saws.

Lester, complete, $10.00..... ...dis 25
Rogers, complete, $4.00. .....dis 25

Sheaves.

Sliding Door R. & E. list Dec 18, 1885... dis 55&2
Sliding Door, Patent Roller.....dis 60&10&2
Sliding Door, Pat'nt Roller, Hatfield's..... dis 70
Sliding Door, Corbin's Anti-Friction Dec. 18, 1885 dis 60&2

Ship Tools.

L. & I. J. White.....dis 20 & 5

Shovels and Tongs.

Iron Head.....50&10&5
Brass Head.....50

Sieves.

Metallic, new list.....dis 60&10
Flour sifters { Victor..... $2 00
Hunter..... $2 25
Comet..... $1 25

Slates.

School, by case..... dis 50&5@50&10

Spoke Shaves.

Iron.....dis 30
Wood .....dis 30

Spoke Trimmers.

Bonney's.....₱ doz $10.00 dis 50
Stearns'.....₱ doz $9.00 dis 20&10

Spoons.

Basting Spoons ..... dis 30&10
Britannia. .....dis 50
Rogers Bros. .....dis 50&10

Squares.

Steel and iron ..... } dis 70@70&10
Nickel plated..... }
Disston's try square and T bevels..... dis 45
Winterbottom's try and miter.....dis 30&10

Steelyards.

dis 40&10@50

Stocks and Dies.

Blacksmith's .....dis 35
"Lightining" screw plate .....dis 1(

Stone.

Hindostan, No. 1, 6c; Axe, 4½c; Slips 9c
Washita Stone .....No. 1, ₱ lb 20
Turkey Oil Stone.....4 to 8 in.....₱ lb 40c
Turkey Slips.....$1.00@1.50
Washita Slips No 1.....₱ lb 37@38
Washita No 2 stone.....₱ lb 15c
Arkansas Stone 2.00

Stove Boards.

Zinc.....70
Daisy.....70

Shovels and Spades.

Ames' list Nov 1 1885..... .....discount 20
Dennis.....5.50
Hussey & Binns, rail road 8.00

Stove Polish.

Joseph Dixon' s.....₱ gross $6 00 dis 10
Gem .....₱ gross 4 50 dis 10
Gold medal.....₱ gross 6 00 dis 25
Rising Sun.....₱ gross $5 50 net
Dixon's plumbago ....₱ lb 8c. net

Trowels.

Lothrops' Brick and Plastering.....dis 25
Reed's Brick and Plastering..... .....dis 25
Disston's Brick and Plastering... dis2o
Brade's brick..... dis 20

Tacks, Brads, &c.

New List, September 1, 1882. & Supplement Jan-1, 1886.

American iron carpet tacks all kinds dis..72½&10
Steel carpet tacks all kinds.....72½@10
Swedes Iron carpet tacks all kinds .....72½&10
Swedes iron tacks.....67½&10
Swedes iron Upholsterers' tacks.....67½&10
Tinned Swedes iron tacks.....67½&10
inned Swedes iron Upholsterers' tacks. ....67½&10
American iron cut tacks .....70&10
Copper tacks .....33⅓&10
Copper finishing and trunk nails.....33⅓&10
Cigar box nails .....45&10
Finishing nails. .....60&10
Hungarian nails and miners' tacks.....60&10
Gimp and lace tacks.....67½&10
" " " tinned.....67½&10
Trunk and clout nails.....60&10
Tinned trunk and clout nails.....60&10
Basket nails.....60&10
Chair nails .....60&10
Common and patent brads.....60&10
Tinned capped trunk nails..... .....60&10

Tinware.

Stamped, Japaned & Pieced, list Jan. 20, 1887..... .....dis 70&10

Tobacco Cutters.

Enterprise Mfg. Co (Champion).....dis 20&10@30

Traps.

Game, Newhouse.....dis 35
Victor.....60&10
Wood, mouse.....15c ₱ doz holes
Delusion, mouse.....₱ gross $18 00 dis 15

Trawsom Lifters.

Wollensak's Patent..... dis 50

Twine.

	BC.	P.
No. 12, Flax Twine, ¼ and ⅛ lb Balls...	21½c	27c ....
No. 18, " " ¼ and ½ " ...	21½	27c ....
No. 36, " " ¼ and ½ " ...	20c	25c ....
2-Ply Hemp, ¼ and ½ lb Balls (Spring Twine)	17	
3-Ply " 1 lb Balls.....	17½c	
3-Ply " 1½ lb Balls	16c	
Cotton Wrapping, 5 Balls to lb.....	15@16c	

Vises.

Solid box.....50&10&5@60
Parker's.....discount 20@25
Prentiss..... " 20 &5@25
Stephen's..... " 25
Saw Filers. Wentworth's .....dis20&10
Saw filers, Stearn's .....33⅓&10

Washer Cutters.

Smith's Patent .....₱ doz $12 00, dis 20&10&10
Johnson's .....₱ doz $11 00, dis 33⅓
Penny's.....₱ doz Pol. $14 00; Jap'd. $16 00, dis 55
Appleton's.....₱ doz $16 00, dis 60&10
Bonney's.....dis 30&10

Well Wheels.

8 in., $2.00; 10 in., $2.50; 12 in., $3.25

Wire.

New List Jan. 18. 1884

Brass and Copper.....discount 20
Bright and annealed, Nos. 0 @18 ... dis70&5@72½
" " Nos. 19 @ 26.....dis 72½@75
" " Nos. 27 @ 36 dis 75@75&10
Coppered Nos. 0 to 18, market list.....dis 65&10@70
Galvanized Nos. 0 to 18 " " dis 60&7½@65
Tinned market Nos. 0 to 18,..... dis 65
Cast steel .....dis 50
Tinned Broom Wire.....dis70@72½
Annealed Fence, Nos. 8 and 9..... dis75
Annealed Grape, Nos. 10 to 14..... dis 75
Stubs Steel Wire regular.....$6 00.@lb dis30

Wrenches.

Coe's genuine, cash in 10 days..... 55 & 3
Girard Standard.....discount 70&10
Agricultural.....discount 75&10
Mechanics' .....dis 55&10 & 3
Bemss & Call's Combination..... 25&10
Donohue's Engeneers'.....25

TINNERS' STOCK.

Tin.

Banca ..... } Market advancing
Straits ..... } add excited. Quo-
English ..... } tations on appli-
Bar..... } cation.

Spelter.

American, cash, ₱ lb.....

Charcoal Tin Plate.

IC 12x12 225 sheets..... $6 00@6 50
IX 14x20 112 sheets..... 7 25@8 00
IC 10x14 225 sheets.....₱ box 5 75@6 25
IC 20x28 112 sheets.....12 25@14 00
IX 10x14 225 sheets .....7 25@8 00
IX 12x12 225 sheets .....7 75@8 25
For each additional X add $1.90@3.00

Coke Tin Plate.

	Best	Ordinary
IC 10x14 } IC 14x20 }	$5 60	

Solder.

Half and Half, in bars warranted } Quotations
No. 1. Refined..... } only
Bingham..... } application.

Zinc.

Zinc, cask.....6¼
inc. open.....6¾

LEAD.

Pig.....5
Bar. ₱ lb.....6
Pipe. ₱ lb.....6½c, net
Sheet. ₱ lb.....6 net
Chilled Shot ₱ bar 25 lbs 1 35

BABBIT METAL.

No. 4.....6
Allens.....9¾
Excelsior.....15
W. B. Genuine.....25

COPPER.

Lake Ingot..... 17
Arizona..... 15¾

IRON AND STEEL.

Flat Bar

1¼ to 4 by ⅜ to 1 inch.....1 75
4¼ to 6 by ⅜ to 1 inch.....1 85
1¼ to 6 by 1⅛ to 2 inch.....2 15
1¼ &1¾ by ⅜ to ¾.....1 85
1 &1⅛ by ⅜ to ¾.....1 85
⅝, ¾ and ⅞ by ⅜ to ⅝.....2 15

Round and Square.

1 to 1¼ inch.....1 75
2 to 2⅝.....1 95
2¾ to 3¼ inches.....2 25
3⅜ to 4 .....2 75
4¼ to 4½ 3 25
4⅝ to 5 .....3 45

Oval.

⅜ to 1¼ inch.....2 15
⅝ to ¾ 2 35
⅞ .....2 5(
1 .....2 95

Half Oval and Half Round.

1¼ to 3 inch.....2 85
⅜ to 1¼ 2 45
⅝ to ¾ 2 95
⅞ 3 25
1 .....4 75

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch.....1 95
1 to 1⅝ by ¼ and 5-16 inch.....2 05
⅜ to ½ by ¼ and 5-16 inch.....2 25
⅝ to ⅞ by ¼ and 5-16 inch.....2 75

Hoops.

1¼ to 4, Nos. 13 to 15.....2 55
1¼ to 2, Nos. 16 to 18.....2 65
1¼ to 2, No. 19.....2 75
1¼ to 2, No. 20.....2 85
1¼ to 2, No. 21.....2 95
1¼ to 2, No. 22.....3 05
15-16, 1 and 1⅛, Nos. 13 to 15.....2 75
15-16, 1 and 1⅛, Nos. 16 to 18.....2 85
15-16, 1 and 1⅛, Nos. 19 and 20.....2 95
15-16, 1 and 1⅛, No. 21.....3 05
15-16, 1 and 1⅛, No. 22.....3 25
⅝, Nos. 13 to 15.....2 95
⅝, Nos. 16 to 18.....3 05
⅝, Nos. 19 and 20.....3 15
⅝, No. 21.....3 25
⅝, No. 22.....3 35
13-16, Nos. 13 to 15.....3 15
13-16, Nos. 16 to 18.....3 25
13-16, Nos. 19 and 20.....3 35
13-16, No. 21.....3 45
13-16, No. 22.....3 55
¾, Nos. 13 to 15.....3 25
¾, Nos. 16 to 18.....3 35
¾, Nos, 19 and 20.....3 45
¾, No. 21.....3 55
¾, No. 22.....3 65
11-16, Nos. 13 to 15.....3 45
11-16, Nos. 16 to 18.....3 55
11-16, Nos. 19 and 20.....3 65
11-16, No. 21.....3 75
11-16, No, 22.....3 85
⅞, Nos. 13 to 15.....3 65
⅞, Nos. 16 to 18.....3 85
⅞, Nos. 19 and 20.....3 95
⅞, No. 21.....4 05
⅞, No 22.....4 15
⅞, No. 23.....4 25

Light Band.

1¼ to 6 by ½ to 3-16 in.....2 25
1½ to 6 by Nos. 11 and 12.....2 3
1 to 1⅝ by ½ to 3-16 in.....2 3
1 to 1⅝ by Nos. 11 and 12.....2 4
⅝ and 13-16 by ½ to 3-16 in.....2 6
⅝ and 13 16 by Nos. 11 and 12.....2 7
¾ and 11-16 by ½ to 3-16 in.....2 9
¾ and 11-16 by Nos. 11 and 12.....3 0
⅝ and 9-16 by ½ to 3-16 in.....3 2
⅝ and 9-16 by Nos. 11 and 12.....3 3
⅞ by ½ to 3-16 in.....3 50
⅞ by Nos. 11 a d 12.....3 60

Wagon Box Iron.

⅝ inch, beveled edge, by Nos. 11 and 12.....2 75
⅝ inch, " " " 13 and 14.....3 05
¾ inch, " " " 11 and 12 .....3 05
¾ inch, " " " 13 and 14.....3 25

Sheet Iron.

No. 10 to 4.....2 45
No. 15 to 17.....2 65
No. 18 to 21.....2 75
No. 22 to 24.....2 85
No. 25 to 26.....2 95
No. 27.....3 05
No. 28 .....3 25

Iron Boiler Plates.

Tank, ¼ inch and heavier.....2 45
C No. 1, " 2 70
C H No. 1, " 2 95
C H Flange, " 3 65
Extra Flange, " 4 05
Solid Fire Box, " 4 95

Steel Boiler Plates—1-4 in. and heavier.

Tank $2 55
Shell $3 05
Flange.....$3 30
Marine Flange.....$3 80
Fire Box.....$4 45
Above includes plates 90 inches wide.
90 to 96 in. wide..... ½c. lb extra.
96 to 100 in. wide.....1 c. "
100 to 104 in. wide.....1½c. "
104 to 116 in. wide.....special.

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts lb
to 2 in. inclusive.....	.09
9-16 to ⅞ in.	.09
7-16 to ⅝ and 2⅛ to 3 in.....	10¼
3⅛ to 4 in.....	.10
⅝ to 11-16 and 4⅛.....	11¼

TRAVELER'S REGISTER.

Standard Time.
Revised March 6th, 1888.

N. Y. C. & St. L. R. R. Co.—"The Nickel Plate."

EASTWARD.	ARRIVE.	DEPART
Buffalo Passenger	10 40 a m	10 45 a m
Chicago Passenger	9 20 p m	.....
Local Freight	4 40 p m	5 45 a m
WESTWARD.	ARRIVE.	DEPART.
Chicago Passenger	.....	6 30 a m
Fostoria Passenger	4 46 p m	4 51 p m
Local Freight	5 20 p m	5 50 a m

Rocky River Accommodation departs 7:40 a. m.; 1:40 p. m.
Euclid Accommodation departs 6:24 a. m. 12:10 a. m., 5:05 p. m.
All trains daily, except Sunday.

Cleveland & Pittsburg.

	ARRIVE.	DEPART.
New York Express	12 45 p m	7 45 a m
New York Express	6 55 p m	1 40 p m
Alliance & Akron Accom.	9 35 a m	3 25 p m
Ravenna Accommodation	8 25 a m	5 00 p m
Night Express	* 5 25 a m	*11 10 p m

Train leaving at 1:40 p. m. has Pullman Buffet Sleeper from Cleveland to New York.
*Daily; all other trains daily except Sunday.

Mt. Vernon & Pan Handle Route

C., A. & C. Ry. Co.	ARRIVE.	DEPART.
Akron, Col. & Cin. "Flyer"	5 40 p m	8 10 a m
Akron, Col. & Cin. Night Express	7 35 a m	8 00 p m
Akron & Columbus Exp	12 45 p m	1 40 p m
Akron & Orrville Accom	9 35 a m	3 25 p m

The 8 p. m. train runs daily. Elegant Pullman palace sleeping cars attached. All other trains daily except Sunday.

Erie Railway.
Depot, South Water St. and Viaduct.

	ARRIVE.	DEPART.
N. Y. & Pitts. Express	15 58 a m	*8 25 a m
Fast N. Y. & Pitts. Express	*10 55 a m	*3 00 p m
Mahoning Accommodation	.....	†6 40 a m
Pittsburgh Express	† 6 25 p m	.....
Youngstown Local	†8 05 a m	.....
Mahoning div. and Pitts Local	.....	*11 40 a m
Mahoning Val Accom	.....	*4 30 p m
Pittsburgh Express	†1 20 p m	11 10 p m
New York Express	*8 00 p m	.....

* Daily. † Daily except Sunday. ‡ Daily except Monday.

Lake Shore & Michigan Southern Railroad.

TRAINS GOING EAST.	Arrive from West.	Depart East.
No. 4, Fast Limited Ex	2 55 a m	*2 55 a m
No. 6, N. Y. & Bos. Ex	*1 35 a m	*1 40 a m
No. 8, N. Y. B'f'o & At Ex	*8 25 a m	*8 50 a m
No. 26, Elyria Accom	†7 45 a m	.....
No. 34, Toledo & Buffalo Accom. via Sandusky	†10 05 a m	†10 15 a m
No. 24, Buffalo Accom	†10 05 a m	†10 15 a m
No. 10, N. Y. & Boston "Flyer."		*11 50 a m
No. 12, N. Y. & Bos. Ex.	*2 35 p m	*3 00 p m
No. 2, Night Express	†9 40 p m	†10 00 p m
No 26, Conneaut Accom	.....	†4 25 p m
TRAINS GOING WEST.	Arrive from East.	Depart West.
No. 1, Fast Limited Ex	*12 15 a m	*12 15 a m
No. 23, Cleveland Express	*2 15 a m	.....
No. 3, Chi. Ex. via Sand'y	15 30 a m	†5 45 a m
No. 25, Mich. Ac. via Norw'k	.....	†5 45 a m
No. 21, Toledo Ex. via Norwalk and Sandusky	†12 50 p m	†3 20 p m
No. 5, Fast St. Louis & Chicago Ex. via Sandusky	*10 50 a m	*10 55 a m
No. 9, Chi. Pac. Ex. via Nor'k	*6 55 p m	*7 15 p m
No. 31, Elyria Accommodation, to Elyria only	.....	†4 30 p m
No. 27, Conneaut Accom	†8 10 a m	.....

Sunday train for Nottingham—Depart 8:15 a. m. and 1:00 p. m.; arrive 9:20 a. m. and 4:45 p. m.
Reference marks—*Daily. †Daily except Sunday. ‡Daily except Monday.
A local Cleveland and New York Sleeper and dining car daily on No. 10, leaving Cleveland at 11:50 a. m., arrives Grand Central Depot, New York 7:30 a. m.
For further information as to trains and connections apply at the Union Ticket Office, corner Bank & Superior-sts., under Mercantile Bank.

M. E. GAUL, City Pass. Ag't. A. J. SMITH, Gen'l Pass. & Ticket Ag't.

Cleveland and Canton Railroad.

Arrive.—Canton, Sherrodsville and Coshocton 9 55 a.m., 7 00 p.m.
Kent —*7 50 a.m., *7 16 p.m.
Bedford—*7:50 a.m., 1:05 p.m., 7 16 p.m.
Newburgh and Miles avenue—7:10 a.m., 4:15, p.m. 5:33 p.m.
Depart—
Canton, Sher'dsville & Cosh't'n—7:00 a.m. and 3:10 p.m.
Kent—*8:38 a.m. and *8:36 p.m.
Bedford—*8:38 a.m., 4:45 p.m., 11:10 a.m., 5:45 p.m.
Newburgh and Miles Avenue—6:12 a.m., 2:00 p.m., 4:40 p.m.
Trains marked with * run daily. All others daily except Sunday.
Depot at Ontario street, and at Huron street

Cleveland, Lorain and Wheeling.

	DEPART.	ARRIVE.
Wheeling Express	6 45 a m	6 55 p m
Uhrichsville Express	4 00 p m	9 20 a m

Pittsburgh & Lake Erie Railroad.

On and after Jan. 2, 1888, passenger trains will depart from and arrive at the Pittsburgh and Lake Erie Depot at Pittsburgh, as follows, Central time:

P. & L. E. R. R. Depart for—
No. 1, Cleveland, Bradford and East..... 5 25 a.m
No. 5, Buffalo, St. Louis, Cleveland..... 7 45 a.m
No. 5, Beaver Falls Accommodation..... 8 40 a.m
No. 7, Buffalo, New York, and all New England points..... 10 15 a.m
No. 9, Chicago, Cincinnati, St. Louis,... 1 10 p.m
No. 11, Buffalo Express..... 3 30 p.m
No. 13, Beaver Falls Accommodation..... 5 20 p.m
No. 15, Buffalo Express..... 10 30 p.m

Arrive from—
No. 2 Beaver Falls Accommodation..... 5 25 a.m
No. 4, Buffalo and Cleveland Night Exp. 6 55 a.m
No. 6, Youngstown Accommodation..... 9 20 a.m
No 8 Beaver Falls Accommodation..... 12 40 p.m
No. 10, Chicago, Cincinnati & St. Louis, 1 35 p.m
No. 12, Buffalo Express..... 5 45 p.m
No. 14, Cincin., St. Louis and Cleveland, 8 05 p.m
No. 14, Cleveland & Buffalo Express..... 10 35 p.m

Pittsburgh & Lake Erie trains Nos. 4, 15, 8 and 10 daily.

E. HOLBROOK, General Superintendent.
R. W. JONES, Master of Transportation.
A. D. SMITH, Gen'l Pass, Ag't, Pittsburgh.

WHEELING & LAKE ERIE

TIME TABLE—IN EFFECT JAN. 8, 1888.
Central Standard Time.

EASTWARD.	No. 5.	No. 7.	No. 9.*	No. 1.*
Toledo.....lv	7 45 AM	1 10 PM	4 50 PM	.....
Oak Harbor...ar	8 41	2 05	5 45	.....
Fremont.....	9 06	2 30	6 10	.....
Clyde.....	9 22	2 47	6 25	.....
Bellevue	9 37	3 03	6 40	.....
Monroeville..lv	9 55	3 20	6 58	3 10 AM
Norwalk	10 10	3 40	7 15	3 22
Wellington	11 00	4 32	8 08	4 00
Creston.....	11 53	5 20	9 05 PM	4 47
Orrville.....ar	12 20 PM	5 48	9 40 PM	5 15*
Orrville.....lv	12 40	5 53	7 05 AM	7 05
Massillon.....ar	1 20	6 35	7 52	7 52
Massillon.....lv	1 20	6 35	7 52	7 52
Navarre	1 35	6 50	8 10	8 10
Valley June.lv.	2 20	7 35	8 55	8 55
New Cumberl'd	2 23	7 48	9 10	9 10
Sherrodsville...	2 45	8 00	9 25	9 25
Leesville	2 52	8 08	9 40	9 40
Bowerston....ar	2 58 PM	8 15 PM	9 50 AM	9 50 AM
Canal Dover....	2 57 PM	.....	.....	.....
New Comerst'n	3 58	.....	.....	.....
Cambridge.....	4 35	.....	.....	.....
Macksburg	6 02	.....	.....	.....
Marietta.....ar	7 13 PM	.....	.....	.....

WESTWARD.	No. 6.	No. 8.	No. 4.	No. 2.*
Marietta lv	6 45 AM	2 20 PM	.....	.....
Macksburg	7 56	1 30	.....	.....
Cambridge.....	9 25	3 00	.....	.....
New Comerst'n	10 23	3 58	.....	.....
Canal Dover....	11 04 AM	4 38 PM	.....	.....
Bowerston.....	11 25 AM	3 45 PM	5 55 AM	.....
Leesville.....	11 32	3 55	6 02	.....
Sherrodsville...	11 40	4 10	6 10	.....
New Cumberl'd	11 52	4 25	6 22	.....
Valley June....	12 20 PM	5 02	6 45	.....
Navarre.....	12 50	5 35	7 35	.....
Massillon.....	1 05	5 50	8 00	.....
Orrville.....ar	1 40	6 25	8 55	.....
Orrville.....lv	1 45	6 35*	9 13	.....
Creston.....lv	2 18	7 02	9 42	.....
Wellington	3 05	7 43	10 33	.....
Norwalk.....	3 55	8 25	11 30	7 25 AM
Monroeville	4 07	8 35	11 45	7 35
Bellevue.....	4 23	9 45	11 59	7 51
Clyde.....	4 39	10 00	12 15 PM	8 06
Fremont.....	4 55	10 17	12 30	8 23
Oak Harbor.....	5 20	.....	12 53	8 45
Toledo.....ar	6 20 PM	11 15*	1 50 PM	9 40 AM

No. 27	No. 25	Huron Divis'n.	No. 26	No. 28
4 50 PM	7 40 AM	Ar. Huron ..Lv	8 55 AM	5 30 PM
4 32	7 22	Friese Landing	9 10	5 45
4 20	7 10	.....Milan	9 28	6 03
Lv 3 55 PM	Lv 6 45 AM	.....Norwalk.....	Ar 9 55 AM	Ar 6 30 AM
Ar	Ar	.....Monroeville..	Lv	Lv

* Daily.
This road is now open through from Toledo to Bowerston, connecting with the Pennsylvania System for all points East.

THROUGH CAR SERVICE.
Between Toledo, Cambridge and Marietta.
" " and Bowerston.
" " and Akron, Youngstown and Pittsburgh.
" Chicago, Akron, Youngstown and Pittsburgh.

M. D. WOODFORD, Gen'l Manager. JAMES M. HALL, Gen'l Pass. Agt.

Scioto Valley Railway

TIME TABLE.
In effect May 27, 1888.
THE SHORT LINE TO ALL POINTS
North and South, East and Southeast, West and Northwest.

TRAINS GOING SOUTH.

STATIONS.	No. 2.	No. 4.	No. 6.
Columbus.....Lv	7 10 a.m	11 25 a.m	5 25 p.m
Valley Crossing...	7 30 "	11 44 "	5 45 "
Lockbourne	7 41 "	11 53 "	5 56 "
Ashville.....	7 55 "	12 07 p.m	6 10 "
Circleville.....	8 15 "	12 26 "	6 30 "
Kingston	8 34 "	12 44 "	6 49 "
Chillicothe	9 01 "	1 30 "	7 35 "
Sharon	9 36 "	2 05 "	8 10 "
Waverly.....	9 46 "	2 14 "	8 20 "
Piketon	9 58 "	2 27 "	8 33 "
Big Run.....	10 12 "	2 41 "	8 47 "
Lucasville.....	10 27 "	2 57 "	9 03 "
Portsmouth	10 50 "	3 20 "	9 25 "
Sciotoville.....	11 05 "	3 35 "	9 40 "
Wheelersburg	11 10 "	3 40 "	9 45 "
Haverhill	11 29 "	3 59 "	10 04 "
Hanging Rock.....	11 40 "	4 10 "	10 15 "
Ironton	11 50 "	4 20 "	10 25 "
Petersburg	12 00 m.	4 30 "	10 35 "
Ashland.....Ar	12 30 p.m	5 00 p.m	11 05 p.m

Trains Nos. 2 and 4 daily, except Sunday.
Train No. 6 daily.
Train No. 6 takes supper at Chillicothe.

TRAINS GOING NORTH.

STATIONS.	No. 1.	No. 3.	No. 5.
Ashland Lv	2 45 a.m	9 05 a.m	5 35 p.m
Petersburg	3 15 "	9 35 "	6 05 "
Ironton	3 26 "	9 46 "	6 15 "
Hanging Rock	3 36 "	9 56 "	6 25 "
Haverhill.....	3 46 "	10 07 "	6 36 "
Wheelersburg	4 06 "	10 28 "	6 55 "
Sciotoville.....	4 12 "	10 33 "	7 00 "
Portsmouth.....	4 27 "	10 05 "	7 15 "
Lucasville.....	4 49 "	11 14 "	7 37 "
Big Run.....	5 04 "	11 32 "	7 53 "
Piketon.....	5 18 "	11 48 "	8 07 "
Waverly.....	5 30 "	12 01 p.m	8 20 "
Sharon	5 40 "	12 11 "	8 30 "
Chillicothe	6 35 "	1 10 "	9 06 "
Kingston	7 01 "	1 26 "	9 31 "
Circleville.....	7 20 "	1 36 "	9 49 "
Ashville.....	7 40 "	1 55 "	10 08 "
Lockbourne	7 55 "	2 15 "	10 22 "
Valley Crossing...	8 06 "	2 39 "	10 31 "
Columbus.....Ar	8 30 a.m	3 00 p.m	10 50 p.m

Train No. 1 daily.
Trains Nos. 3 and 5 daily, except Sunday.

COUPON TICKETS, by the best routes and to all principal points in the United States and Canada, can be found at the following Stations: Columbus, Circleville, Kingston, Chillicothe Waverly, Portsmouth, Ironton, A. C. & I. Ashland.
For further information relative to rates, connections and through time, call on your Ticket Agent, or address J. ROBINSON, Receiver.
JNO. J. ARCHER, Gen'l Pass. & Ticket Ag't, Columbus, Ohio.

Ft. Wayne, Cincinnati & Louisville

RAILROAD.
THE POPULAR ROUTE
BETWEEN THE
NORTH and SOUTH
THE DIRECT ROUTE TO OR FROM
FORT WAYNE,
INDIANAPOLIS,
TERRE HAUTE,
EVANSVILLE,
AND ST. LOUIS.

13 MILES SHORTER —BETWEEN— **13**
Fort Wayne and Indianapolis
Than any other Route.

22 MILES SHORTER AND QUICKER **22**
By 3 HOURS, Between
Louisville and Fort Wayne.

Ask for Tickets
—VIA—
Ft. Wayne, Cincinnati & Louisville Railroad.

For sale by all Agents of connecting lines, EAST, WEST, NORTH AND SOUTH.

W. W. WORTHINGTON, Gen'l Supt. S. A. WIKEL, Gen'l Ticket Agent, FORT WAYNE, IND.

The Picturesque Lehigh Valley Route.

Two through trains with Pullman cars attached are now run via by this beautiful scenic route, between Suspension Bridge, Buffalo, New York and Philadelphia, leaving Suspension Bridge 8:35 A. M. and 3:40 P. M., Buffalo 9:15 A. M. and 5:15 P. M., connecting with all trains from the West.

Passengers between the East and West passing over the famed LEHIGH VALLEY ROAD will experience the pleasure of a trip through the most magnificent and picturesque scenery in the world, presenting an ever varying panorama of delightful surprises.

Double track, steel rails, magnificent road bed and unrivaled equipment, all combine to make the LEHIGH VALLEY the favorite and most desirable route between the East and the West.

Anthracite Coal is used entirely, guaranteeing the passengers perfect freedom from the dense volumes of smoke that so greatly annoy passengers on lines using Bituminous Coal.

E. B. BYINGTON, Gen'l Pass. Agent, Bethlehem, Pa.

GRAND EXCURSIONS

THURSDAY, JULY 29th.

To Put-in-Bay Fare $1.00. } On Palace Steamer **City of Detroit**

Steamer leaves 23 River St. at 9.00 A. M., city time, returning at 6.30 P. M.

TO DETROIT Fare $2.00. } Changing to Steamer **City of Cleveland.**

Returning at 5.30 next morning, in time for business.

Brass and String Music. 2½ Hours at the Bay.

Detroit & Cleveland

STEAM NAVIGATION CO.

Week Days **FOR DETROIT** 9.00 P. M.

Special Sunday Night and Thursday Morning Trips, July and August.

Four Trips **For Mackinac** per Week, and Lake Huron Way ports.

All Departures from 23 River Street.

E. B. WHITCOMB, G. P. A. T. F. NEWMAN, G. A

Valley Short Line.

CLEVELAND, AKRON, CANTON & MARIETTA.

DEPART.
No. 1, Mail, 7:30 a m daily.
No. 3, Fast Express, 11:20 a m, daily, except Sunday.
No. 5, Youngstown Accommodation, 2:30 p m, daily, except Sunday.
No. 7, Fast Express, 4:30 p m, daily.
No. 9, Akron Accom., 7:45 p. m., daily.

ARRIVE.
No. 2, Cleveland Accom., 7:45 a m daily.
No. 4, Fast Express, 9:55 a. m., daily.
No. 6, Fast Express, 2:30 p m, daily, except Sunday.
No. 8, Cleveland Accom., 5.45 p m, daily, except Sunday.
No. 10, Mail, 7:15 p m, daily.
Depot—South Water Street.

WM. THORNBURGH, Gen. Manager. R. A. CARRAN, Gen. Pass. Ag't.

THE FAVORITE AND Picturesque Route TO New York, Boston and the East.

THE SHORTEST AND QUICKEST ROUTE TO PITTSBURGH, WASHINGTON AND BALTIMORE, AND THE SOUTHEAST.

Change of time goes into effect May 20, 1888.
Central, or Nineteeth Meridian time, 33 minutes slower than Cleveland city time.
Until further notice trains will leave from the New Central Depot, South Water Street and Viaduct, as follows:

	Depart.
No. 62, Mahoning Valley Accommo	† 6 40 a m
No. 72, New York Express,	* 8 30 a m
No. 72, Fast Pittsburgh Express	* 8 30 a m
No. 64, Fast New York Express	* 3 00 p m
No. 64, Pittsburgh Express	* 3 00 p m
No. 66, Youngstown Accommo	* 5 00 p m
No. 68, Pittsburgh Express	†11 10 p m
No. 68, New York Express	†11 10 p m
No. 70, Pittsburgh Local Express	*11 40 a m
No. 74, Shenango Valley Express	† 4 00 p m
	Arrive.
No. 73, Shenango Valley Express	† 9 25 a m
No. 61, New York Express	† 5 45 a m
No. 61, Pittsburgh Express	† 5 45 a m
No. 65, Fast New York Express	*10 55 a m
No. 65, Pittsburgh Express	*10 55 a m
No. 67, Pittsburgh Express	† 1 20 p m
No. 63, New York Express	* 7 05 p m
No. 69, Pittsburgh Express	* 8 40 p m
No. 77, Youngstown Local	* 7 25 a m
No. 13, Erie Express, carrying express matter only, from all points East and South-east, carries no passengers (except Monday)	† 1 20 p m

* Daily † Daily, except Sunday.

☞This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City and intermediate points without change. No change to Boston and New England cities.
Baggage checked through to all points East.
Through tickets and information regarding the route can be obtained at office, 141 Superior street, and at Central Depot, South Water street and Viaduct, Cleveland. Ship by Erie Express.

E. B. THOMAS, 2d Vice President, Cleveland, O.
L. P. FARMER, Gen'l Pass. Agent, New York.
W. C. RINEARSON, Ass't G. P. A., Cincinnati, O
M. L. FOUTS, City Passenger Agent, 141 Superior Street, Weddell House, Cleveland, O.

Cleveland & Marietta R. R.

THROUGH LINE BETWEEN
Marietta, Caldwell, Cambridge, Newcomerstown, Canal Dover, Canton, Akron, Cleveland, Buffalo, Toledo Pittsburgh, New York, Coshocton, Newark, Zanesville, Columbus, Chicago and St. Louis.

In effect April 22d, 1888.

GOING NORTH.			GOING SOUTH.	
No. 4.	No. 2.	STATIONS.	No. 1.	No. 3.
9 55 AM	2 00 AM	..Parkersburg...	2 45 PM	11 55 AM
12 20 PM	6 45	.....Marietta.....	10 15 AM	7 13
12 40	7 05	.....Caywood.....	9 55	6 53
12 46	7 11	..... Stanley.....	9 49	6 47
1 00	7 25	.....Whipple.....	9 35	6 32
1 10	7 35	.....Warner.....	9 25	6 22
1 23	7 48	.....Elba.....	9 12	6 09
1 30	7 55	...Macksburg...	9 05	6 02
1 37	8 01	...Dexter City...	8 58	5 55
1 41	8 05	...South Olive...	8 54	5 50
1 48	8 12	.....Dudley.....	8 47	5 43
1 57	8 20	.....Caldwell.....	8 40	5 36
2 07	8 30	..Belle Valley...	8 30	5 26
2 17	8 40	..... Ava.....	8 19	5 16
2 29	8 52	..Pt. Pleasant...	8 07	5 04
2 42	9 04	.....Byesville.....	7 53	4 50
3 00	9 25	...Cambridge...	7 36	4 35
3 07	9 32	.....Oldham's.....	7 27	4 27
3 14	9 40	.....Miller's.....	7 20	4 20
3 24	9 50	...Kimbolton....	7 10	4 10
3 39	10 05	.....Guernsey	6 56	3 55
3 47	10 12	.....Post Boy	6 49	3 47
3 58	10 23	N. Comerstown	6 40	3 38
4 05	10 30	..... Wolf's	6 31	3 29
4 17	10 43	..Phillipsburg ..	6 20	3 17
4 22	10 48	..Black Band	6 14	3 12
4 28	10 54	.....Turner's	6 09	3 06
4 38	11 04	...Canal Dover..	6 00 AM	2 57
5 00	11 27	ar. Vall'yJ'n. lv		2 35
5 02	11 35	lv. Vall'yJ'n. ar		2 20
	12 19 PM	.....Canton.....		1 30
	1 12	..... Akron.....		12 31
	2 36	... Cleveland.....		11 20 AM
	8 00	.....Buffalo		5 40
11 15 PM	6 20	.....Toledo.....		7 05

Train No. 8 leaves Marietta at 1 40 p. m., Whipple 2 40, Warner 3 00, Elba 3 20, Macksburg 3 35, Dexter City 3 47, Caldwell 4 25, arriving Cambridge 6 30 p. m. Train No. 5 leaves Valley Junction at 5 13 p. m., arriving at Canal Dover 5 35 p. m.
Through coaches on trains Nos. 2 and 3 between Marietta, Canton, Akron, Cleveland an Toledo. Close connections made at Mariett with C., W. & B., M., C. & N., Z. & O., and Ohi River Packets; at Cambridge with B. & O., eas and west; at Newcomerstown with P., C. & St. L. east and West; at Canal Dover with C., L. & W and C. & P., north and east; at Valley Junction with W. & L. E. and Valley R'y.

W. K. RICHARDS, Gen. Pass. Agt
A. T. WICKOFF, Gen. Manager.

¼ to 6 in.	11¼
¼ to 9-32 and 6⅛ to 7 in.	12
3-6 in.	14

Flats.

	cts. ℔
2 to 9-16 wide by 2 to ⅝ thick	0

Bessemer and O. H. Steel.

	cts. ℔.
Machinery	base price. 02¾
Tire	" 02¾
Spring	" 03¼
Sleigh Shoe	" 02¾
Toe Calk	" 03
Cutter Shoes, tapered and burr	" 03

For extra sizes, see classification below.

Machinery Steel.

ROUNDS AND SQUARES.

	cts. per ℔ ex.
1 to 3 in. incl.	base
3⅛ to 4 "	0.3
4⅛ to 6 "	1.0
¾ to 15-16 "	0.2
¼ to 11-16 "	0.3
⅝ to 7-16 "	0.4
5-16 to 11-32 "	0.5
¼ and 9-32 "	0.7

Machine cutting, specified lengths, ab'e 24 in....0.2
Machine cutting, specified lengths, 12 to 24 in....0.4
Machine cutting to specified lengths less than 12 inches, according to contract, but not less than 0.6 cents on each size extra. Sawing, one-half of the above extra for cutting.

FLATS. cts. per ℔ ex.

1¼ to 6 in., by 5-16 to 1 in. thick	base
1¼ to 6 in., by ¼ and 9-32 in. thick	0.2
1½ to 6 in., by 3-16 and 7-32 in. thick	0.3
1½ to 6 in., by ⅛ and 5-32 in. thick	0.4
¾ to 1 7-19 in., by ¼ to 1 in. thick	0.3
½ to 1 7-16 in., by 3-16 and 7-32 in. thick	0.4
¾ to 1 7-16 in., by ⅛ and 5-32 in. thick	0.5
⅜ to 11-16 in., by ¼ to ½ in. thick	0.4
⅜ to 11-16 in., by 3-16 and 7-32 in. thick	0.6
⅜ to 11-16 in., by ⅛ and 5-32 in. thick	0.8
⅜ to ¾ in., by 1-16 and 3-22 in. thick	2.0
13-16 to 1½ in., by 1.16 and 3-32 in. thick	1.5
1¼ to 3 in., by 1-16 and 3-32 in. thick	1.0

These extras apply on Tire, Toe-Calk, Shoe and Flat Machinery Steel, also on Cutter Shoes.

SPRING STEEL FLATS. cts. ex.

1¼ to 4 in. by No. 4 gauge to ⅛ in. inclusive,	base
1 and 1½ in. by No. 1 gauge to 4 gauge "	0.2
1 to 3 in. by No. 5 gauge to 7 gauge "	0.5
⅞ to 3 in. by No. 8 gauge to 10 gauge "	1.0
¾ to 3 in. by No. 11 gauge to 16 gauge "	2.0
¼ to 3 in, by No. 17 gauge to 20 gauge "	3.5
⅜ to ⅝ in. by No. 10 gauge to 16 gauge "	4.0
⅜ to ⅝ in. by No. 17 gauge to 20 gauge "	5.0
⅜ to ⅝ in. by No. 21 gauge to 24 gauge "	6.0

Bessemer and Open Hearth cut to length, 24 nch and over 1-10 cent per lb. extra, and under, y special contract.

ROUND SPRING STEEL. cts. ex

⅝ to 1½ inches	base
⅛ to 9-16 inches	0.2
⅜ to 7-16 inches	0.5
5-16 inches	1.0
¼ inches	1-5

English Tool Steel.

Jessops	16c
Hob'on's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

¼, ⅝, 11-16 and ¾ inches diameter	4 00
Bridge ¼, ⅝, 11-16 and ¾ inch diam	4 00

Rolls and Castings.

Furnace floor and straightening plates	1¼c
Housings and castings not otherwise specified	1¾c
Guide plates	2½c
Spindles and coupling boxes	1¾c
Sand rolls and pinions, large size	2 c
Sand rolls and pinions, small size	2¼c
Pipe mill castings	3 c
Rolling mill castings under 50lb	2 c
Spur and bevel wheels, large	3 c
Spur and bevel wheels, small	3¼c
Pulleys up to 30 inches	4 c
Pulleys over 30 inches	3¼c
Engine castings, light	3¼c
Engine castings, heavy	2¾c

SCRAP IRON AND OLD METAL

	Net Ton.
No. 1 R. R. wrought scrap	$23 00
No. 1 wrought scrap	20 00
No. 1 Machine cast scrap	15 00
Stove plate (free from burnt iron)	10 50
Grate bars	11 00
Pipes and flues (Clean)	13 00
Tank iron	12 50
Hoop and band iron	10 00
Iron axles	28 00
Light sheet iron	10 00
Axle turnings	16 00
Wrought turning (free from cast)	15 00
Wrought iron, oily drillings	14 00
Cast borings	11 00
Malleable iron	10 50
Uncut wrought iron boilers	10 00
Steel boiler plates	14 50
Old iron T rails	gross tons $27 00
Old steel rails	23 00
Car wheels	20 00
Old copper	per ℔ 7
No. 1. H. red Brass	8¼
Heavy yellow brass	6½
Light yellow Brass	6
Scrap Zinc	3
Tea Lead	3
Heavy Lead	3¼

WROUGHT IRON PIPE.

DISCOUNTS.

	Discount Per Ct.
Wrought iron pipe: Butt black X str	
XX str	55
Wrought iron pipe: Lap black X str	
XX str	55
Wrought iron pipe: Butt galv	45
" Lap "	50
Lap-welded boiler tubes	50
" drive pipe	.....
" casing	.....
Lead pipe per ℔	.....
Sheet lead "	.....
Galvanized spiral pipe	50
" " fittings	30
Patent adjustable ells	40
Globe ventilators	60
Tin tubing	50
Fittings for same	30
Expanding conductor pipe and fittings	40
Cast iron piece fittings for wrought iron pipe, black and galv	70
Bushings and plugs	75

Malleable unions	65
" flange unions	72½
Long screws	70
Gas pipe hooks	50
Cast iron flanges, manifolds and expansion pipe hangers	65
Hook, ring and expansion plates, coil stands	67½
Iron body: Globe, angle, check, cross, safety, butterfly, throttle, back pressure and foot valves	65&10
Iron body: Expansion joints and iron cocks, all iron	65&10
Iron body: Iron cocks with brass plugs	60&10
Straight way valves	.....
Brass: Globe, angle, check, cross safety, and radiator valves	60&10
Throttle and butterfly valves	50&10
Brass: Fin. globe valves, with finished brass wheels	40&10
Brass: Steam, service, meter and union meter cocks	57½&10
Brass: Expansion joints and steam bibbs	50&10
Mississippi gauge cocks	55
Bingham "	.....
Gas proving pumps	50
Oil cups, lubricators and air cocks	60&10
Cocks for steam gauges	60&10
Cylinder cocks	50&10
Comp. gauge cocks	55&10
Water gauges, steam whistles and whistle valves	60&50
Gas fixture fittings	50
McNamara hydrants and street washers	Spec'l
Stop cock boxes	Spec'l
Galvanized wrought iron range boilers, to 52 gallons	65
Galvanized wrought iron range boilers, larger	50
Stands for same	40
Copper bath tubs	20
Closets	Spec'l
Cast iron soil pipe, to 6 in. inclusive	60
" " fittings, to 6 in. inclusive	60&5
Cast iron sinks	70
" slop sinks	60
Drive-well points	50
Ground key work:	
Rough and fin. plain, tray and bath bibbs	55&10
" " stops, shower stops, hydrant and ball cocks	
Compression:	
Rough and fin. plain, tray and bath bibbs	50&10
" " stops; urinal, hopper, hydrant and ball cocks	50&10
Basin cocks, from No. 1 to 13 inclusive	50&10
" " above No. 13, and double basin	40&10
Shampooing and sink cocks	40&10
Pantry cocks	50&10
Shampooing sprinklers	50&10
Double bath cocks and chain stays	50&10
Hose goods, plain and water back couplings	55&10
Boiler couplings, ground face, per set net, $1.25	10
Boiler couplings plain face, per set net, $1.20	10
Basin plugs and grates; bath, sink and wash tray plugs	60&10
Soldering nipples and unions	65&10
Union joints	60&10
End ferrules; street washer screws, checks and guides	55&10
Hydrant and basin clamps, hydrant sockets	55&10
Pipe taps, reamers and dies	60
Plain pipe tongs and gas plyers	50
Wrenches: Coe	50 & 5
" Girard agricultural	65
" " standard	60 & 5
" Stillson	33⅓
" Armstrong	25 & 5
" Bemis & Call	25 & 5
" Rouse	30
" Bauer's	10
Pipe tongs: Brown's adjustable	50
" Jarecki	50
" Robbins' chain	10
" Brock's	10
Vises: Plain pipe	55
" Smith comb	50
" Parker's comb	50
" Bauer's pipe and bolt	10
Machinists' hammers	40
Copper "	Spec'l
Pipe cutters: Stanwood	20
" Eureka	45
" Saunders	40
" Barnes	50 & 5
Malleable oilers and hand lamps	Spec'l
Screwing stocks	60
Armstrong's adjustable stocks and dies	25&10
Waste, at manufacturer's prices.	
Gas fitters' cement	Spec'l
Hair felt	Spec'l
Riley Bros. cement	Spec'l
Otley Bros. steam packing	Spec'l
Mineral wool	Spec'l
Lubricating compound	Spec'l
Malleable iron fittings, black and galv	25
Wrought iron couplings and nipples, black and galv	70

Standard Wrought Iron, Steam, Gas and Water Pipe.

Nominal Size Inside Diameter.	Price per Foot, Black.	Price per Foot, Galvanized.	Thickness.	Nominal Weight per Foot.	No. of Threads per in. of Screw.	Price, Extra Threads.
In.			In.	Lbs.		
⅛	0 04	0 05	.068	0 24	27	0 05
¼	0 04	0 05	.088	0 42	18	0 05
⅜	0 04	0 05½	.091	0 56	18	0 05
½	0 05	0 07	.109	0 84	14	0 05
¾	0 07	0 09	.113	1 12	14	0 05
1	0 09½	0 12½	.134	1 67	11½	0 06
1¼	0 12½	0 17	.140	2 24	11½	0 07
1½	0 22	0 25	.145	2 68	11½	0 08
2	0 28	0 32	.154	3 61	11½	0 10
2½	0 44	0 49	.204	5 74	8	0 15
3	0 58	0 64	.217	7 54	8	0 20
3½	0 70	0 86	.226	9 00	8	0 25
4	0 85	1 00	.237	10 66	8	0 35
4½	1 00	1 25	.246	12 49	8	0 45
5	1 20	1 50	.259	14 50	8	0 55
6	1 65	2 00	.280	18 76	8	0 70
7	2 00		.301	23 27	8	0 85
8	2 75		.322	28 18	8	1 00
9	3 70		.344	33 70	8	1 20
10	4 75		.366	40 06	8	1 25
11	5 75		.375	45 02	8	1 50
12	6 50		.375	49 00	8	2 50
13	7 75		.375	54 00	8	
14	9 00		.375	58 00	8	
15	10 00		.375	62 00	8	

Extra Strong, double above list.

Double Extra Strong, double list of Extra Strong.

LAP-WELDED BOILER TUBES.

Size, Outside Diameter, inches	1	1¼	1½	2	2¼	2½	2¾	3	3¼	3½	4
Price per foot	23	23	23	22	25	28	31	34	38	43	52
Price, Lap-Welded Drive Pipe	8	10	12	15							

DRIVE PIPE SHOES.

	6"	8"	10"	12"
Long, Separate	13 00	15 00	20 00	25 00
" Shrunk on pipe	16 00	18 00	25 00	30 00
Short, Separate	12 00	14 00	17 00	22 00
" Screwed on pipe	13 00	15 00	19 00	24 00

DRIVE PIPE HEADS.

	12 00	15 00	18 00	22 00

LAP-WELDED CASING.

Size, Inside Diameter Nominal	2	2¼	2½	2¾	3	3¼	3½	4	4¼	4½	4¾	5	5 3-16	5⅝	6¼	6⅝	7⅛	8¼	8⅝	9⅝
Price, per foot	25	28	31	34	38	43	45	52	56	60	66	72	79	86	1 00	1 30	1 45	1 85	2 10	2 25	2 75

Tarred or Asphalt and Kalamein Pipe, list and discount furnished on application.

WEST'S

MOULDERS' TEXT-BOOK:

BEING PART II OF

AMERICAN FOUNDRY PRACTICE.

Presenting best methods and orig al ru for btaining good, sound, clean castings, and giving detailed description for making moulds requiring skill and experience.

Also containing a practical treatise upon the construction of cranes and cupolas, and the melting of iron and scrap steel in iron foundries. By

THOMAS D. WEST,

Practical iron moulder and foundry foreman member of the American Society of Mechanical Engineers and of the Civil Engineers' Club of Cleveland, Ohio.

12mo. Cloth, $2.50

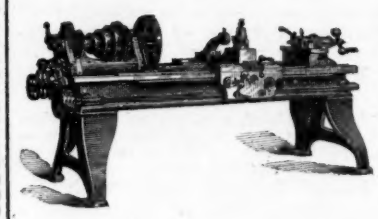
Fully illustrated and with complete index Will be mailed, prepaid, on receipt of the price.

On receipt of $3.00 we will send the above book and the IRON TRADE REVIEW for one year

Address

CLEVELAND PRINTING AND PUB. CO

CLEVELAND, OHIO



The McFarlan & Nottingham Co.

MANUFACTURERS OF

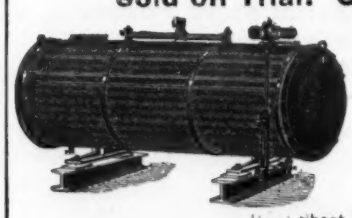
LATHES, PLANERS, SHAPERS AND DRILL PRESSES.

220 West Second St.,

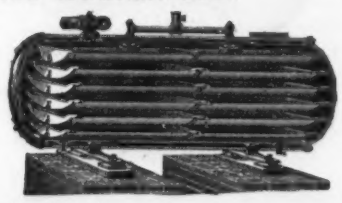
CINCINNATI, OHIO. 321y

The HOPPES Feed-Water PURIFIER.

Sold on Trial. Clean Boilers Guaranteed.

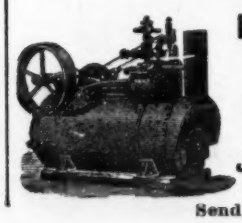


SEND FOR DESCRIPTIVE CIRCULAR A



Hard Sheet Steel Troughs easily cleaned.

HOPPES MANUFACTURING CO., - - Springfield, Ohio.



BOOKWALTER ENGINES

UPRIGHT AND HORIZONTAL,

3 TO 10 HORSE POWER.

OVER 3,000 IN SUCCESSFUL OPERATION.

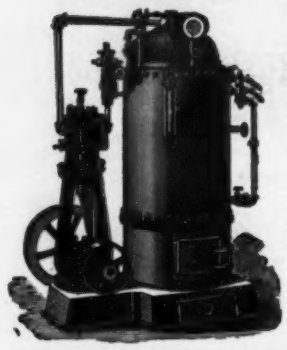
Illustrated Pamphlet sent free. Address,

JAMES LEFFEL & CO., Springfield, Ohio.

Eastern Office: 110 Liberty St., New York.

Send for Catalogue B, and mention this paper.

THE CLINE ENGINES.



The most compact, best built and cheapest engine manufactured. Boilers of Steel tested to 180 pounds pressure. A written guarantee with every outfit.

2-Horse Power Engine and Boiler, Complete, Ready to Run, **$150.**

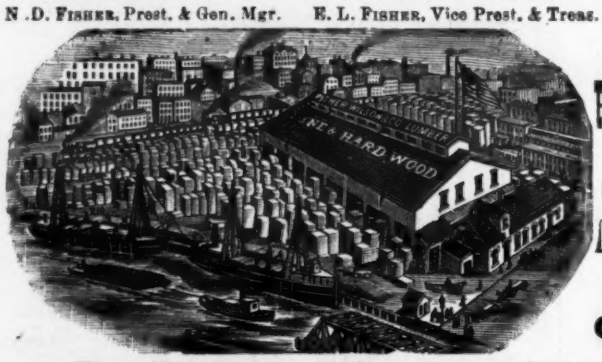
4-Horse Power, - $230.

Usually rated at 3 and 5 Horse Power by other makers. 2, 4, 6, 8 and 10 Horse Power Stationary, Yacht and Launch Engines and Boilers. Write for Catalogue.

ELMER E. CLINE,

50 and 52 Ely Ave., - - - ALLIANCE, O.

N. D. Fisher, Prest. & Gen. Mgr. E. L. Fisher, Vice Prest. & Treas. A. M. Allyn Sec.



—THE—

Fisher & Wilson Co.

WHOLESALE

Pine & Hardwood

Lumber Dealers,

47 CENTRAL WAY,

Cleveland, O.

Fine Hardwood Finishing Lumber a Specialty.

PLAIN OAK, QUARTERED OAK, ASH, CHERRY, WALNUT, YELLOW POPLAR, HICKORY, RED BIRCH, ROCK MAPLE, BIRD'S EYE MAPLE, WHITE MAPLE, BEECH, ELM, SOUTHERN PINE.

Bridge and Car Timber Cut to Order. 42

The Eureka Furnaces.

Are the ONLY SELF-FEEDERS for SOFT COAL,

and are equally adapted for

HARD COAL or COKE

With unequaled record for efficiency and economy.

—ALSO—

"New Champion" Steel Plate Furnaces

Second to no surface burner in the market; for **Hard or Soft Coal, Coke or Natural Gas.**

THESE FURNACES ARE MADE IN VARIOUS SIZES.

And arranged for either brick or galvanized iron casing, and are placed under our own supervision. Before selecting a Furnace for your residence, store-room or church, call upon us, or

Send Postal for Catalogue with Testimonials.

AGENT WANTED IN EVERY CITY.

THE BRYCE FURNACE CO.,

DAYTON, OHIO,

PATENTEES AND MANUFACTURERS. 03-1y

C. H. PRESLEY & CO., Office, 24 So. Water St., CLEVELAND, O.

Tools, Supplies and Machinery.

AGENCIES:

STERLING EMERY WHEEL CO.,

Emery and Corundum Wheels.

BICKFORD BRILL CO.,

UPRIGHT DRILL PRESSES.

CHAMPION BLOWER & FORGE CO.,

Blowers, Exhausters, Forges, &c.

I. B. WILLIAMS & SONS,

Oak Tanned Leather Belting, R. H. Lace.

P. L. SWORD.
C. D. SWORD.

AUTOMATIC DOUBLE PRESS BRICK MACHINE.

PATENTED AUG. 24. '84

P. L. SWORD & SON.

IMPROVED BRICK MACHINE. CLAY CRUSHERS, CARRIERS. BARROWS & BRICK YARD SUPPLIES. PORTABLE Hake & Truck.

OFFICE & WORKS, Bessemer Ave

Nos. EUCLID AVE., ROOM 4.

Cleveland, O.

F. E. Drury, Pres't. H. P. Crowell, Sec'y.

THE Cleveland Foundry CO.,

CLEVELAND, O.,

Manufacturers of

Light Gray Iron Castings,

Japaning, Electro-Plating in Nickel, Bronze and Copper.

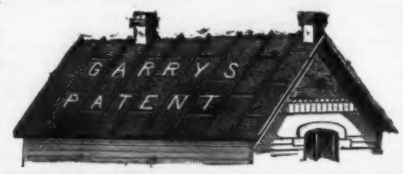
Hardware Specialties made on Contract.

We solicit corespondence and samples for estimate.

OFFICE AND WORKS ON

Platt St. and C. & P. R. R.

☞ Take Woodland cars to Carr St. 421y



GARRY IRON ROOFING COMPANY,

The Largest Manufacturers of Iron Roofing in the World,

MANUFACTURERS OF ALL KINDS OF

Iron Roofing, Crimped and Corrugated Siding, Iron Tile or Shingle, Fire-Proof Doors and Shutters, Iron Ore Paint and Cement.

Iron Frames for Roofs and Buildings.

No. 152 MERWIN ST., CLEVELAND, OHIO.

☞ Send for circulars and price list No. A

Cambridge Roofing Co.,

Manufacturers of

CROWL'S PATENT STANDING SEAM,

Plain Rolled, Corrugated and Crimped Edge,

Roofing, Siding and Ceiling. Made of Steel and Charcoal Iron, awarded First Medal by the New Orleans Exposition.

CAMBRIDGE - OHIO

WORSWICK MFG. CO.

MANUFACTURERS OF MALLEABLE AND CAST IRON FITTINGS,

AND BRASS GOODS. Jobbers of Plumbers', Gas and Steam Fitters' Tools and Supplies.

Sole manufacturers of **The Worswick Patent Radiators.**

AGENTS FOR IRON PIPE AND BOILER TUBES.

Corner Water and St. Clair Streets, 42 **CLEVELAND, O.**

SYKES IRON ROOFING CO., NILES, O.

SYKES' IMPROVED Best Roof in the World. Suitable for all classes of Buildings. Easy Put On.

All my Iron is Re-Rolled and Box Annealed, well Painted on both sides with Best of Paint and Pure Linseed Oil.

☞ Send for Circular and Price List, and mention this Paper.

THE ÆTNA MACHINE COMPANY,

SOLE MANUFACTURERS OF THE

Aetna Medium and High Speed Engines.

300 to 1000 Horse Power. Latest Design.

For Rolling Mills, Furnaces, Pipe Works, Grist and Saw Mills, Etc. Also Manufacturers of

Upright Engines from 10 to 150 H. P.

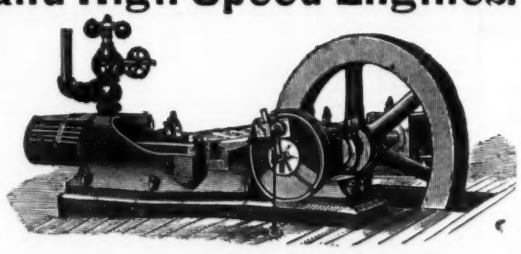
Rolling Mill and Special Machinery, Light and Heavy Castings, and

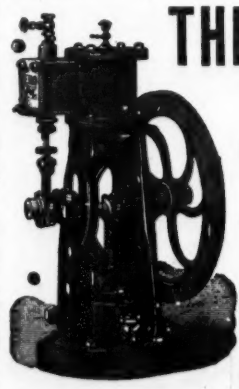
M. V. SMITH'S

Gas Producer and Furnace.

ENGINES ALWAYS IN STOCK.

Warren, - Ohio.





THE LAIDLAW & DUNN CO.,

CINCINNATI, O.

Manufacturers of the

"Hero" Vertical Boiler-Feeders,

—AND—

"STANDARD" DUPLEX PUMPS

WITH BRASS REMOVABLE WATER CYLINDERS.

Send for descriptive circulars.

Purchasers —of— McGOWAN PUMP CO Est'd 1862.

GEO. C. KEENE & CO.,

MANUFACTURERS

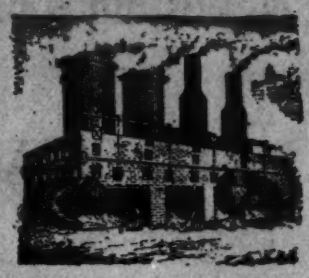
Cornice and Roofing Machines.

148 and 150 E. Front St.. 92-3m Cincinnati, O.

Sandusky Metal Works.

FRED KRANZ, Proprietor.

Manufacturer of



IRON LIME KILNS,

Copper, Sheet Steel and Sheet Iron Work for Brewers and Distillers.

PLUMBING, GAS AND STEAM FITTING.

STEAMBOAT WORK A SPECIALTY.

OFFICE: 731 Water St.. SANDUSKY, Ohio.

04-1y

Over 25,000 IN USE.

OTTO GAS ENGINE WORKS

Schleicher, Schumm & Co., { Philadelphia. Chicago.

Horizontal OTTO Gas Engines.
Vertical OTTO Gas Engines.
Twin Cylinder OTTO Gas Engines.
Combined OTTO Gas Engine Pumps.
Combined OTTO Gas Engine Dynamos

SIZES: 1, 2, 4, 7, 10, 15, 25 and 50 horse-power.

SEBASTIAN, MAY & COMPANY'S Improved Screw Cutting Foot or Power Lathes.

Catalogue of Lathes, Drill Presses & Machinists' Tools and Supplies mailed on application. Lathes on Trial.

164 W. Second St., 44-1y CINCINNATI, O.

SECTION OF CONVEYOR.

THE JEFFREY MANU'FG CO.

116 W. State St., Columbus, O.

Manufacturers of

Roller and Detachable Chain for

Elevators, Conveyors, Drive Belts

For handling

COAL, ORES, GRAIN,

Barrels, Boxes, &c

Send for 1887 Illustrated Catalogue.

Correspondence Solicited.

E. E. GARVIN & CO.

Manufacturers of

Machinists' & Iron Workers' Tools

LATHES, PLANERS, MILLING MACHINES AND DRILLS.

We received Gold Medal for our New UNIVERSAL MILLER at the N. O. Exposition. (See cut.)

Special Tools for all kinds of Manufacturing to order. Gear and Rack Cutting, Milling and Index Drilling to order..

139-143 Center St., NEW YORK.

W. BINGHAM & CO.,

146, 148 & 150 Water St.,

CLEVELAND, O.

Hardware, Iron, Nails and Metals

OF EVERY DESCRIPTION.

RAILWAY, MACHINISTS' AND MINERS' SUPPLIES.

Wm. Jessop & Sons and Peter Stubs' Celebrated Cast Steel.

Malleable and Cast Gas and Water Fittings.

Nathan & Dreyfus' Self-Acting Oilers and Lubricators, Injectors and Ejectors; Pennsylvania Tube Works Pipe and Boiler Flues; Peet's Open Way Valves; Boston Belting Co.'s Rubber Belting, Packing and Hose; Alexander Bros.' Leather Belts.

STUBS, CROBET & ROTHERY FILES, ETC., ETC.

G. W. STOCKLY, President. J. J. TRACY, Vice-President. W. F. SWIFT, Secretary. J. POTTER, Treasurer. N. S. POSSONS, Supt. W. J. POSSONS, Asst. Supt. S. M. HAMILL, Jr., Asst. Secretary.

THE

Brush Electric Co.,

SOLE MANUFACTURERS UNDER ALL THE

Patents of Charles F. Brush, for Electric Lighting, Storage Batteries, Carbons, Electro-Plating Machines, Electro Motors, Etc.

THE BRUSH LIGHT STILL LEADS THE FIELD.

No other System in the World equals ours in Simplicity, Durability, Earning Capacity, Reliability. The Best is always the Cheapest. 45,000 Brush Arc Lamps now in use. Self-Regulating Incandescence Apparatus.

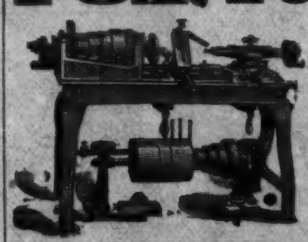
GET OUR AGENT TO MAKE PLANS FOR YOU BEFORE BUYING ELSEWHERE.

THE BRUSH ELECTRIC CO.

CLEVELAND, OHIO, U. S. A.

AGENCIES EVERYWHERE 93

Fox, Turret and Speed LATHES



And Brass Finishers' TOOLS.

CAGE MACHINE WORKS, Waterford, New York.

S. M. York, Agent, 42, 44 & 46 S. WATER ST CLEVELAND, O.

STEEL CASTINGS

FROM ¼ TO 15,000 Lbs. WEIGHT.

TRUE TO PATTERN, sound, solid, free from blow-holes, and of unequalled strength. Stronger and more durable than iron forgings in any position, or for any service whatever. 40,000 Crank Shafts and 30,000 Gear Wheels of this steel now running prove this. Cross-Heads, Rockers, Piston Heads, etc., for Locomotives. STEEL CASTINGS of every description. Send for Circulars and prices to

CHESTER STEEL CASTING CO.,

WORKS: Chester, Pa. OFFICE: 407 Library St., Philadelphia, Pa

SPENCERIAN STEEL PENS

Are The Best

Established 1860.

USED BY THE BEST PENMEN

Noted for Superiority of Metal, Uniformity, and Durability.

20 Samples for trial, post-paid, 10 Cents.

IVISON, BLAKEMAN, TAYLOR, & CO., 753 and 755 Broadway, New York.

NEW OTTO RUBBER TIRE

BICYCLES.

NO STRONGER BICYCLE MADE.

A. W. GUMP & CO., Dayton, O.

52 inch, factory price $60.00, our price $40.00.
50 " " " 55.00, " " 35.00.
48 " " " 50.00, " " 33.00.
46 " " " 45.00, " " 30.00.
44 " " " 40.00, " " 27.00.

Order quick. Also 250 second-hand Wheels. Repairing and Nickeling. Bicycles and Guns taken in trade.

Champion Rubber Bucket CHAIN PUMP.

Manufactured by S. E. Crawford NORWALK, OHIO.

Chain Pump Pipe Buckets, Common & Expansion, Wood Force Pumps; also dealer in Steel Chain—best quality. Special inducements to parties ordering car lots. Correspondence solicited.

Patents.

H. T. FISHER,

SOLICITOR AND COUNSELOR,

Late Examiner U. S. Patent Office. Eight years experience in Examining Corps. Prices moderate. Satisfaction guaranteed. Write or call for particulars. [95]

34 Blackstone Building. CLEVELAND, O.

WEBER & LIND SIGN WORKS.

Artistic Signs.

Cor. Ontario & Huron Strs., CLEVELAND, O.

Show Cards; Silk Banners, Bunting, Flags and Streamers; Picture Painting; Carved Wood; Metal, Glass and Cloth Signs. 93

MUGLER & KRAUS,

ENGRAVERS - ON - WOOD,

89 Euclid Avenue,

Telephone 2240. CLEVELAND, O.

J. E. Scott, Mfgr. of Awnings & Tents of every description.

Water-proof Horse Clothing, &c.

10 and 12 Woodward Ave., [92-1y] DETROIT Mich

THE AMERICAN
Manufacturing, Mining & Milling Co.,

MANUFACTURERS OF ALL KINDS OF GOLD AND SILVER

Mining Machinery

CLEVELAND, OHIO.

SPECIALTIES.—The Linn Double-Jaw Rock Breaker and Ore Crusher; The Standard Pulverizer (for wet pulverizing); The Crescent Pulverizer (for either wet or dry pulverizing) Howland's Rapid Amalgamator; Secor's Improved Amalgamating Pan (for treatment of refractory ores); Howland's Improved Disintegrating and Concentrating Riffles.

Agents Wanted. Correspondence Solicited. Catalogues Sent on Application.

The STANDARD TOOL Co.

CLEVELAND, OHIO,

Manufacturers of

INCREASE TWIST DRILLS, &c.,
TAPER SHANK DRILLS,
Straight Shank Drills,
Machine Bit Drills,
Screw Driver Bits,
Bit Stock,

Sockets,
Hand and
Shell Reamers,
Standard Gauges,
Milling Cutters and Special
Tools, Morse Taper Reamers.

—Standard Patent—

Twist Drill Grinding Machine.

New York Office, 33 Chambers Street. 07

MT. VERNON IRON WORKS,

Oldest and Largest Works in the Country.

C. & G. Cooper & Co., Prop's,

Manufacture

Corliss Automatic Cut-off Engines,

50 to 450 Horse Power.

Slide Valve Stationary Engines

All Sizes, Extra Heavy, with Girder, Box Frame.

PORTABLE ENGINES, Center and Side Crank, 6 to 40 H. P.

TRACTION ENGINES, 8 to 18 H. P.

SAW MILLS, Extra Heavy, Standard and Pony, with Self-receding Blocks and Late Improvements.

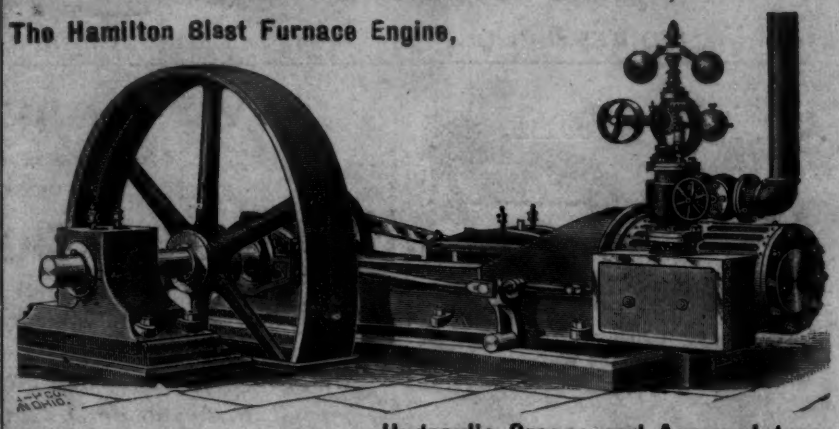
ubular, Locomotive and Flue Boilers.

Send for Prices and Descriptive Circulars. [15] Address C. & G. COOPER & CO., Mt. Vernon, O.
I. H. Pratt, Agent, 89½ St. Clair St. Cleveland, O.

William Tod & Co., Youngstown, O.,

THE PORTER-HAMILTON ENGINE,

The Hamilton Blast Furnace Engine,



Hydraulic Cranes and Accumulators.

☞ Heavy special machinery generally. Send for illustrated catalogue.

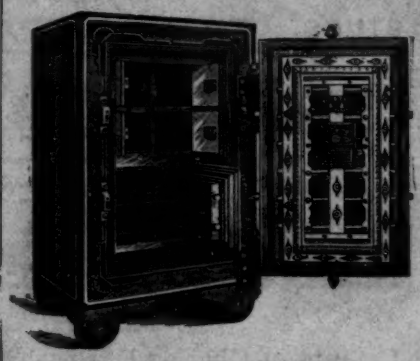
J. SMITH. H. E. TEACHOUT. F. W. SMITH

SMITH & TEACHOUT,

Manufacturers of **BOILERS, TANKS and STILLS** of all Descriptions.

REPAIRING PROMPTLY EXECUTED. PLATE AND SHEET IRON WORK. ALSO FLUES TAKEN OUT, PIECED AND RESET. NEW FLUES ON HAND.

644 and 646 Broadway. Telephone 1121. [91-1y] CLEVELAND, O.



—NATIONAL—
SAFE & LOCK CO.,

BRAINARD BLOCK,

North Side Public Square, - Telephone 399.

CLEVELAND, O.

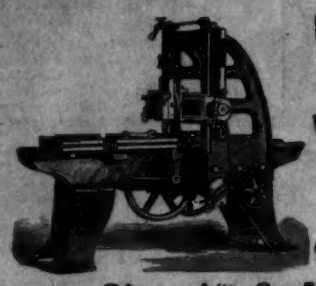
—MANUFACTURERS OF—

Fire & Burglar Proof Safes,

BANK VAULTS, SAFETY DEPOSIT BOXES, TIME AND COMBINATION LOCKS.

WORKS,

C. & P. R.R., bet. Garden & Quincy Sts.

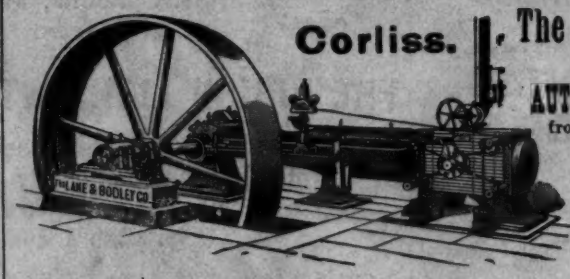


Lathes, Planers
SHAPERS,
DRILL PRESSES,
Wood-working Machinery
Engines and Boilers.

Wood-Split Pulleys, Shafting, Hangers and Couplings. Write for Prices—it will pay you.

Sherrin & Ashworth Machinery Co.,

80 Water Street and 98 1st Avenue, 92-1y PITTSBURGH, PA.



Corliss.

The Lane & Bodley Co.

Manufacturers of

AUTOMATIC CUT-OFF ENGINES

from heavy patterns and of unexcelled workmanship.

STEEL BOILERS,
Feed Water Heaters,

SHAFTING, PULLEYS, GEARING

THE LANE & BODLEY CO.
Nos. 1 to 25 John Street.
CINCINNATI, O.

CANTON IRON ROOFING CO., Canton, Ohio,

MANUFACTURERS OF THE H. W. SMITH PATENT

CORRUGATED

STEEL ROOFING

Made of genuine sheet steel and calamined steel.

Corrugated Iron

Roofing and Siding. Beaded Iron Ceiling and Siding, Crimped Edge Roofing and Siding. Roof Paint, Roofer's Paper, &c.

BEADED

Send for catalogue, price list and samples. [06-6m]

For First Class
STEAM BOILERS, STACKS, SHEET IRON & PLATE WORK, OIL AND WATER TANKS.

BOILERS

ADDRESS: ENTERPRISE BOILER Co. YOUNGSTOWN, OHIO.

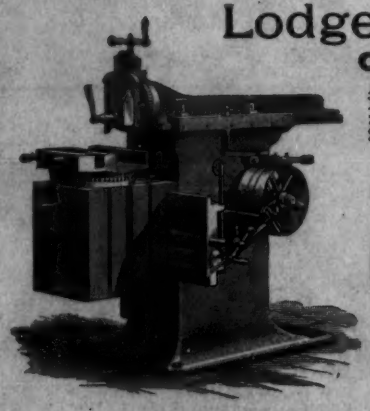
Shapers, Engine Lathes and Drills.

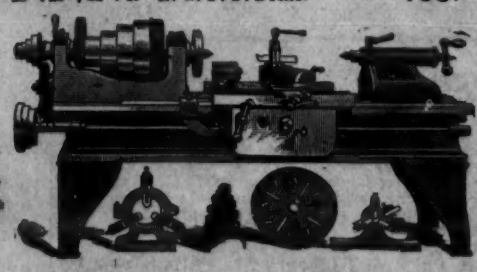
Lodge, Davis & Co.,

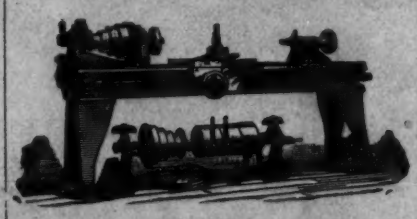
Cincinnati, Ohio. SEND FOR PRICES.

15", 20", 26", 32" Shapers,
17", 19", 21", 24", 27" Engine Lathes
20", 24" Upright Drills,
25", 28", 32", 40" B. G. P. F. Drills.

IT WILL PAY YOU.







NEW AND IMPROVED

17-Inch Engine Lathes.

Any length of bed. Workmanship strictly first-class.

THE MULLER MACHINE TOOL CO.,

8th and Evans Sts., [44] CINCINNATI, O.

BOILERS

MAHONING BOILER WORKS
ESTABLISHED 1863.
PIPES STACKS BEAMS ROOF TRUSSES
BLAST FURNACES & ROLLING MILL WORK
WM. B. POLLOCK & Co YOUNGSTOWN OHIO.